

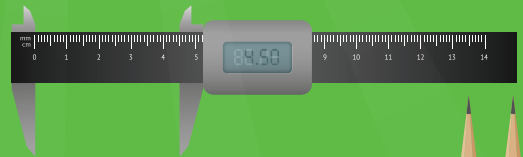


Jamhuuriyadda Federaalka Soomaaliya

Wasaaradda Waxbarashada,
Hiddaha Iyo Tacliinta Sare.

Xisaab

Tababarka Macallimiinta
Waxbarashada Aasaasiga ah
Sanadka 2aad

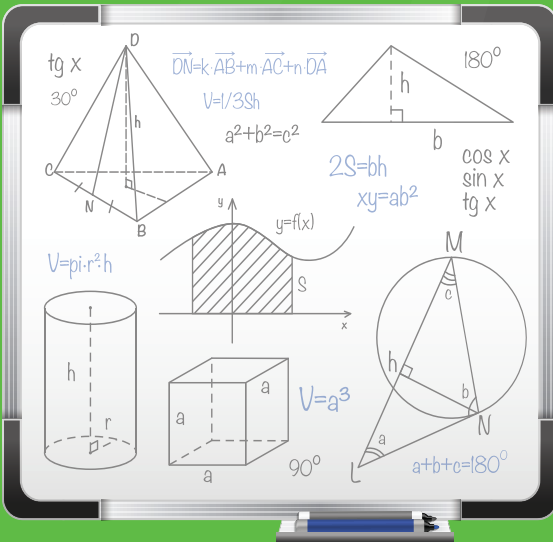


$$\begin{aligned} 2A &= gh \\ a/b &= \tan x \\ a/c &= \sin y \\ A &= 90^\circ \\ S &= \frac{1}{2} \pi r^2 \end{aligned}$$

Daabacaadda

2

2025



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Maaddada Xisaabta

Ujeedooyinka Guud ee Xisaabta Heerka 2aad

Dhammaadka heerkani qodobbadan waaweyn ee soo socda ayaa la filayaa in la gaaro. Haddaba, bare-ardeydu waxa ay:

1. Ka kobacsan yihiin sooyaalka hababka tirooyinka gaar ahaan tirooyinka lakab kuwa lakabka la' iyo sidoo kale tirooyinka maangalka ah.
2. Furfuraan mas'alooyinka la xariira aljebra, isla'egyada fudud iyo isla'egyada wadajira.
3. Yaqaanaan xirfado la xiriira nolol maalmeedka oo ay ku taxaneyaasha iyo sunsunka iyo dareerinnada.
4. Furfuraan mas'looyin ay ku jiraan joometari: saddex xagalladda, noocyada saddex xagallada, iyo barta kala barta saddex xagallada.
5. Cabbiaan bedadka iyo bed duleedyada shaxannada joometeriga.
6. Helaan cabbirada u janjeeridda dhexda iyo cabbirada kala taksanaanta.

Cutubyada Maaddada Xisaabta ee Sanadka 1aad

Dhammaadka buuggaan bare-ardaydu waxa ay baran doonaan cutubyada soo socda kuwaasoo kala ah:

1. Tirooyinka lakab iyo tirooyinka lakabka la'
2. Tirooyinka maangalka ah.
3. Aljebra
4. Sunsun iyo dareerin
5. Taxenayaal
6. Joometeri

7. Cabbiraadda
8. Tirignoometeri
9. Istaatistikis

Hababka Baridda iyo Barashada

Bixinta buugga heerkaan dhexdiisa macallimiintu waxa ay adeegsadaan jidad kala duwan si loogu gudbiyo casharka dhammaan bare-ardeyda. Iyadoo la eegayo arintaa macallimiintu waxa ay adeegsanayaan qaababka horumarin kara barashada sida:

1. **Barashada firfircoon-** bare-ardaydu waa inay si micne leh uga shaqeeyaan hawsha ku aadan mirodhalka waxbarashada.
2. **Barashada waayo-aragnimada** - Waa waxbarasho ka timid sahmin, helitaan, fal ama hawl gacmeed.
3. **Barashada horumarinta xirfadaha-** Waa mid ku saleysan helitaan xirfado baahsan, sida fakir hal-abuur iyo xallinta caqabadaha. Baruhu waa fududeeye, ee ma aha cilmi gudbiye sidaa darteed, waxaa ka badalaya habka uu macallinku yahay xuddunta baridda iyo barashada waxa uu u badalayaa habka ay bare-ardeydu ka firfircoon yihiin macallinka.

Macallimiintu waa in ay u adeegsadaan gudbinta habab kala duwan si ay u gaarsiiyaan dhammaan ardeyda iyadoo aan loo eegin awood yaraan.

Waxaa xusid mudan in bare-ardaydu ay noqonayaan udub dhexaadka barista iyo barashada manhajkaan si ay tababarka ugu qaataan si guul ah una wada gaaraan dhammaan miraha laga filaayo buuggaan.

Habka Ardaygu Xudunta u Yahay

Habkani waa mid uu ardaygu udub dhexaad u yahay barashada casharka, kaasoo u dhaca siyaabo kala duwan sida, labo-labo ama koox u shaqayn si ay ardaydu isku dhaafsadaan fikradaha iyo aqoonta. Marka ardaydu sidaas u shaqaynayaan, baraha shaqadiisu waa inuu hubiyo sida ay ardaydu wax u qabanayaan, si uu u ogaado ardayda horey wax uga shaqaysay, kuwa aan si fiican wax u fahmin, si loo caawiyo. Baruhu marka uu ogaado awooda ardayda waxa uu awoodi karaa inuu isku darto arday wax yaqaan iyo mid aan si fiican wax u fahmin si ay u kala faa'iidaystaan. Sidoo kale waxaa muhiim ah in la ogaado, in ardaydu uu midba meel ku fiican yahay.

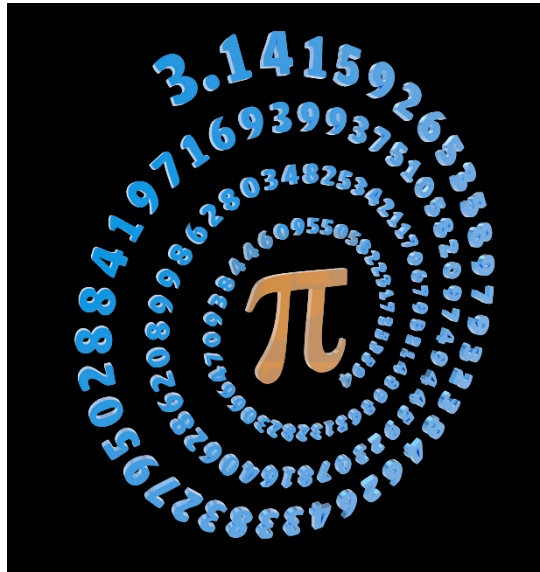
HABABKA QIIMEYNTA

Manhajka tababarka macallimiinta dugsiyada hoose dhexe waxaa uu u aqoonsan yahay in qiimeyntu ay ku lammaanan tahay hab socodka barista iyo barashada. Dowrka qiimeyntu waa in ay:

1. bixisaa talo soo jeedin iyo warbixin ku saabsan horumarka ay bare-ardeydu sameeyeen ee ka muuqda miradhalka waxbarasho si loogu adeegsado tilmaan marka la rabo in wax la saxo ama la caawiyo ardeyda.
2. u suurto gelisaa bare-ardeyda ogaanshaha maaddooyinka ay ku wanaagsan yihiin iyo kuwa ay ku liitaan, si kor loogu qaado waxbarashadooda.
3. wargelisaa macallimiinta, maamulka dugsiga iyo wasaaradda horumarka guud ee bare-ardeydu ka sameeyaan mirodhalkii barasho ee laga filaayey.

Gaar ahaan qiimeyntu waxa ay diiradda saareysaa qodobada soo socda:

1. Kasbashada bartaha ee aqoonta, xirfadaha iyo qiyamka.
2. Awoodda ay bartayaasha u leeyihiin in ay xirfadihii iyo aqoontii ay ka kasbadeen fasalka ku dabaqaan nolol maalmeedkooda.
3. In si cad loo arki karo in bare-ardeydu ku dhacay isbadel aqooneed iyo habdhaqaneed.



Horudhac

Marka aad doonayso in aad tiriso tirada buuggaagta ku jirta armaajadaada, waxa aad ku bilaabaysaa 1, 2, 3, Tirooyinkaas waxaa loo yaqaanaa tirooyinka tirsiiimo. Haseyeeshee, haddii ay armaajadu maran tahay waxa aan oran karnaa wa eber oo looqoro 0. Sidoo kale haddii aan ku biirino eber tirooyinka tirsiiimo waxaa inoo soo baxaya

0, 1, 2, 3,waxaana loo yaqaanaa tirooyinka idil. Dhanka kale, waxaa loo baahan karaa in la xisaabiyo tirooyinka lagu tilmaamo jihada sida kor iyo hoos kuwaas oo lagu sunto togan (+) iyo taban (-) markaa waxaa inoo samaysmaya abyooneyaasha sida-2, -1, 0, +1, +2, waxaa jira iyana jajabyo loo qori karo habka $\frac{a}{b}$, ururka tirooyinka ay ku jiraanna waxaa loo yaqaan ururka tirooyinka lakab waxaa kaloo jira urur tirooyinka lakabka la'.

Haddaba cutubkaan waxa aan ku baran doonnaa ururka tirooyinka lakab iyo kuwa lakabka la'.

Tusmada Cutubka

Cutubkaan waxa aan ku baran doonnaa casharada soo socda:

1. Tirooyinka lakab
2. Xisaabfallada tirooyinka lakab.
3. U Tibaaxidda Tiro Lakab Jajab Tobanle Ahaan
4. Tirooyinka Lakabka La'.
5. Xididdada Laba Jibbaaran.
6. Xididdada Saddex Jibbaaran.

Ujeedooyinka Cutubka

Dhammaadka cutubkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Kala saari karaan tirooyinka lakab iyo kuwa lakabka la'.
2. Furfuri karaan xisaabfallada tirooyinka lakab.
3. U tibaaxi karaan tiro lakab jajab tobanle ahaan.
4. Heli karaan xididdada laba jibbaaran.
5. Heli karaan xididdada saddex jibbaaran.

1.1 Tirooyinka Lakab

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

- Qeexi karaan tiro lakab.
- Gartaan astaamaha tirooyinka lakab.
- Isbarbardhigi karaan tirooyinka lakab.

Waxqabadka 1aad

Haddii dhererka fasal uu yahay 9.5 m islamarkaana ballaciisu yahay 3.5m, haddaba, haddii aan ognahay in tirooyinka 5, 3, 9 ay ka midyihiin ururka tirooyinka tirsimo iyo abyoonayaasha ayaa waxa aan baaraynaa ururka ay ka tirsan yihiin tirooyinka kala ah 9.5 iyo 3.5.

Waxqabadka 2aad

Waxa aan ka fakaraynaa kadibna dhamaystiraynaa:

Tirada 2.4 waxaa loo qori karaa $\frac{24}{10}$, haddaba waa tiro lakab.

Tiradad -3 waxaa loo qori karaa $-\frac{3}{1}$, haddaba waa tiro lakab.

Tiradad $3\frac{1}{2}$ waxaa loo qori karaa _____, haddaba waa _____.

Tiradad 2.35 waxaa loo qori karaa _____, haddaba waa _____.

Qeexid: tiro kasta oo u qoran qaabka $\frac{a}{b}$, halka a iyo b ay yihiin abyoonayaal, b -na aysan la ekeyn eber ($b \neq 0$) ayaa loo yaqaanaa tiro lakab.

Waxqabadka 3aad

Haddii Fiidow uu ciyaaray 11 ciyaarood islamarkaana uu ku guuleystay 3 ka mid ah, haddaba waxa aan u qoraynaa qaabka tiro lakab.

Waxqabadka 4aad

Suleymaan ayaa waxa uu haystaa 100 *dollar*. Waxa uu sadaqeystay 20 *dollar*. Hadababa waxa aan u qoraynaa qaabka tiro lakab.

Waxqabadka 5aad

Waxa aan qoraynaa qaar ka mid ah tirooyinka lakab.

Tirooyinka kala ah $\frac{5}{8}$, $-\frac{3}{14}$, $\frac{7}{-15}$ iyo $\frac{-6}{-11}$ mid kasta oo ka mid waa tiro lakab maadaama ay u qoranyihiin qaabka $\frac{a}{b}$, islamarkaana hooseyahoodu ay ka duwan yihiin eber.

Waxqabadka 6aad

Dugsi ku yaalla magaalo ka mid ah Soomaaliya ayaa waxa ardayda loo keenay buugaagta waxbarashada oo tiradoodu dhantahay 200, tirada ardayda dhigata dugsiga waa 400, hadaba waxa aad raadisaa arday kasta inta buug ee ku soo aaday?

Waxqabadka 7aad

Tusaalooyinkan soo socda waxa ay ku saabsanyihiin tirooyinka lakabka ah. Haddaba waxa aan caddeyneynaa in ay yihiin tiro lakab:

- Nin xoola jire ah ayaa waxa uu iibiyaa haan caano ah oo dhan hal litar iyo bar, $1\frac{1}{2}$ liter.
- Bajaajle ayaa waxa uu iibsaday shidaal dhan 3.25 liter.
- Arday ayaa waxa uu helay darajo dhan 17.5 imtixaanka maadada xisaabta.

Waxqabadka 8aad

Hooyo Faaduma ayaa waxa ay u soo iibisay carruurteeda 3 litar oo caano ah, tirada carruurta waa 4, haddaba immisa litir oo caana ah ayaa ku soo aadaysa cunug kasta.

Isbarbadhig kooban oo ku saabsan tirooyinka lakab iyo kuwa lakab la'

Nooca isbarbadhigga	Tiro lakab	Tiro lakab la'
Qeexidda	Tirooyinka loo qori karo sida jajab (b/t) halka t iyo b ay yihiin abyooneyaal, t-na aysan noqon karin eber). " $t \neq 0$ ".	Tirooyinka aan loo qori Karin jajab ahaan
Qaab jajab tobanle ah	Waa mid soo qoqoda, ama dhamaada	Waa mid aan soo noqnoqonin, aanan dhamaanaynin
Tusaale	$\frac{1}{2}$, 3, -5, 0.75, 0.333.	$\sqrt{2}$, π (Baay), e, φ (Faay), 1.4142135.

1.1 .1 Lakabyada Togan

Tiro lakab waxa ay tahay mid togan haddii sarreeyaha iyo hooseeyaha tiradaas ay wada toganyihiin ama ay wada tabanyihiin.

Tusaalaha 1aad: Waxa aan tusaaleynayaa tirooyin lakab oo togan.

Furfuris

Tirooyinka lakab ee kala ah $\frac{5}{7}$ iyo $\frac{-2}{-3}$ waa ay togan yihiin.

1.1 2 Lakabyada taban

Tiro lakab waxa tahay mid taban haddii sarreeyaha iyo hooseeyaha tiradaas ay midi togan tahay midda kalana taban tahay.

Tusaalaha 2aad: Tirooyinka lakab ee hoose middee togan middeese taban?

$$\frac{-4}{9} \text{ iyo } \frac{5}{-12}.$$

1.1.3 Astaamaha Tirooyinka Lakab

Astaamaha tirooyinka lakab waxaa ka mid ah saddexda astaamood ee hoose:

Astaanta 1aad: Haddii $\frac{a}{b}$ ay tahay tiro lakab misana m ay tahay abyooone ka duwan eber, haddaba $\frac{a}{b} = \frac{a \times m}{b \times m}$.

Tusaalaha 3aad: waxa aan raadineynaa tirooyinka lakab ee u dhigma $\frac{-3}{4}$.

Furfuris

$$\begin{aligned} \frac{-3}{4} &= \frac{(-3) \times 2}{4 \times 2} = \frac{(-3) \times 3}{4 \times 3} = \frac{(-3) \times 4}{4 \times 4} = \dots \\ \frac{-3}{4} &= -\frac{6}{8} = -\frac{9}{12} = -\frac{12}{16} = \dots \end{aligned}$$

Tirooyinka lakab ee caynkaas ah waa ay isu dhigmaan.

Astaanta 2aad: Haddii $\frac{a}{b}$ ay tahay tiro lakab misana m ay tahay isir ay wadaagaan a iyo b , haddaba $\frac{a}{b} = \frac{a \div m}{b \div m}$.

Tusaalaha 4aad: waxa aan u tibaaxeynaa tirada lakab $\frac{-32}{40}$ saansaanta ugu fudud.

Furfuris

Tirada lakab ee $\frac{-32}{40}$, waxaa loo tibaaxi karaa $\frac{-32}{40} = \frac{-32 \div 8}{40 \div 8} = \frac{-4}{5}$

Habka Istaandarka ah ee tiro lakab

Tirada lakab ee $\frac{a}{b}$ ayaa la yiraahdaa waxaa loo qoray hab istaandar ah haddii ay a iyo b yihiin abyoonayaal islamarkaana ay u qoranyihiin saansaanta ugu fudud oo isirka ay wadaagaanna uu yahay keliya 1, sidoo kalena b ay tahay mid togan.

Tusaalaha 5aad: U tibaax $\frac{33}{-44}$ habka istaandarka ah.

Furfuris

$$\therefore \frac{33}{-44} = \frac{33 \times (-1)}{(-44) \times (-1)} = \frac{-33}{44}$$

Maadaama i.w.w labada tiro ee 33 iyo 44 uu yahay 11

$$\frac{33}{-44} = \frac{-33 \div 11}{44 \div 11} = \frac{-3}{4}$$

Haddaba, $\frac{-33}{44} = -\frac{3}{4}$ (Habka Istaandarka ah)

Astaanta 3aad: Haddii $\frac{a}{b}$ iyo $\frac{c}{d}$ ay yihiin laba tiro lakab haddaba, $\frac{a}{b} = \frac{c}{d} \Leftrightarrow (a \times d) = (b \times c)$.

$$\begin{array}{cc} a & c \\ b & d \end{array} \quad \begin{array}{c} \diagup \diagdown \\ \diagdown \diagup \end{array} \quad \begin{array}{c} c \\ d \end{array}$$

$$a \times d = b \times c$$

1.1 .4 Isbarbardhigga Tirooyinka Lakab

Waxqabadka 9aad

Labo carwo ayaa usoo bandhigay macaamiishooda dharka ciidda ee carruurta. Carwada koowaad waxay ay samaysay qiimo dhimis dhan $\frac{2}{35}$, halka ay carwada kalena samaysay qiimo dhimis dhan $\frac{3}{50}$. Haddaba, carwadee ayaad kula talin lahayd macaamiisha in ay wax ka iibsadaan? Sheeg sababta.

Marka aan isbarbardhigayno laba tiro oo lakab waxa aan marka hore ogaaneynaa in:

1. Tiro lakab kasta oo togan ay ka wayntahay eber.
2. Tiro lakab kasta oo tabanne ay ka yartahay eber.

Marka xigta waxa aan raacaynaa tallaabooyinka hoose si aan isu barbardhigno tirooyinka lakab:

1. Ka dhig hooseeyaha tiro lakab kasta mid togan.
2. Raadi dh.y.w labada hooseeye ee togan.
3. Tiro lakab kasta ee kasoo baxday tallaabada 1aad kadhig hooseeyahooda dh.y.w gii kuusoo baxay.
4. Tirada yeelata sarreeye wayn ayaa ka wayn midda kale.

Tusaalaha 6aad: waxa aa sheegeynaa midka wayn labada tiro lakab ee kala ah $\frac{3}{-4}$ iyo $\frac{-5}{6}$.

Furfuris

Marka hore hooseeyaha ayaa ka dhigaynaa mid togan.

Tirada hore, $\frac{3}{-4} = \frac{3 \times (-1)}{(-4) \times (-1)} = \frac{-3}{4}$

$$\text{Tirada kale} = \frac{-5}{6}$$

Dh.y.w labada hooseeye ee 4 iyo 6 waa 12

$$\text{Haddaba, } \frac{-3}{4} = \frac{(-3) \times 3}{4 \times 3} = \frac{-9}{12}$$

$$\text{iyo } \frac{-5}{6} = \frac{(-5) \times 2}{6 \times 2} = \frac{-10}{12}$$

Waxaa muuqata in labada sarreeye $-9 > -10$.

$$\text{Haddaba, } \frac{-3}{4} > \frac{-5}{6}$$

Tusaalaha 7aad: waxa aan u tibaaxeynaa horsanaanta degata tirooyinka

lakab ee kala ah $\frac{-3}{5}, \frac{7}{-10}$ iyo $\frac{-5}{8}$.

Furfuris

Marka hore waxa aan hooseeyaha tirada $\frac{7}{-10}$ ka dhigaynaa mid togan

$$\frac{7 \times -1}{-10 \times -10} = \frac{-7}{10}$$

Dh.y.w hooseeyayaasha kala ah 5, 10 iyo 8 waa 40

$$\frac{-3}{5} = \frac{(-3) \times 8}{5 \times 8} = \frac{-24}{40}$$

$$\frac{-7}{10} = \frac{(-7) \times 4}{10 \times 4} = \frac{-28}{40}$$

$$\text{iyo } \frac{-5}{8} = \frac{(-5) \times 5}{8 \times 5} = \frac{-25}{40}$$

Waxaa inoo muuqda, in $\frac{-28}{40} < \frac{-25}{40} < \frac{-24}{40}$

$$\text{Haddaba, } \frac{-7}{10} < \frac{-5}{8} < \frac{-3}{5}$$

Layli

1. U tibaax hooseeyaha tirada lakab $\frac{-3}{5}$ sidaan:
 - i. 20
 - ii. -30
 - iii. 35
 - iv. -40
2. Ka dhig toddobo hooseeyaha tirada lakab $\frac{-42}{98}$.
3. Ka dhig shan hooseeyaha tirada lakab $\frac{-48}{60}$.
4. U tibaax tirooyinka soo socda saansaan istandarka ah.
 - i. $\frac{-12}{30}$
 - ii. $\frac{-14}{49}$
 - iii. $\frac{24}{-64}$
 - iv. $\frac{-36}{-63}$
5. Is barbardhig tirooyinka lakab ee hoose:
 - i. $\frac{-4}{3}$ iyo $\frac{-3}{7}$
 - ii. $\frac{7}{-9}$ iyo $\frac{-5}{8}$
 - iii. $\frac{-1}{3}$ iyo $\frac{4}{-5}$
 - iv. $\frac{9}{-13}$ iyo $\frac{7}{-12}$
 - v. $\frac{4}{-5}$ iyo $\frac{-7}{10}$
 - vi. $\frac{-12}{5}$ iyo $\frac{-3}{1}$

1.2 Xisaabfallada Tirooyinka Lakab

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

- Isugeyn karaan tirooyinka lakab
- Kala goyn karaan tirooyinka lakab.
- Isku dhufan karaan tirooyinka lakab.
- Isu qeybin karaan tirooyinka lakab.

1.2 .1 Isugeynta Tirooyinka Lakab

Waxqabadka 1aad

Xaawo ayaa waxa ay dooneysaa in ay ku akhriso qisada Nabi Maxamed naxariis iyo nabad galyo korkiisa ha ahaatee (NNKH) muddo saddex maalmood ah. Haddaba, haddii ay go'aansato in ay maalinka 1aad ku akhriso saddex meelood meel ka mid ah qisada, maalinka 2aadna laba shanaad ka mid ah qisada, haddaba waa sheegeynaa wadarta inta ay ka akhrisay qisada.

Si aan isugu geyno labo tiro lakab, marka hore waxa aan hooseyaha tiro lakab kasta ka yeelaynaa mid togan (haddii loo baahdo).

waxaa jira xaalado mudan tixgelin:

Xaaladda 1aad: Tirooyin Lakab oo Isku Hooseeye ah

Tani waxa ay la mid tahay adiga oo isku geynaya laba jajab oo isku hooseeye leh, markaa waxaa la isu geeyaa labada sarreeye ayada oo labada hooseeyana mid laga qaadanayo.

Haddii $\frac{m}{n}$ iyo $\frac{r}{n}$ ay yihiin laba tiro lakab oo isku hooseeye ah islamarkaana

($n > 0$), haddaba $\frac{m}{n} + \frac{r}{n} = \frac{m+r}{n}$

Tusaalaha 1aad: Isugee tirooyinka lakab ee kala ah:

$$\text{b) } \frac{5}{7} \text{ iyo } \frac{-3}{7} \qquad \text{t) } \frac{7}{-11} \text{ iyo } \frac{3}{11}$$

Furfuris

$$\text{b. } \frac{5}{7} + \frac{-3}{7} = \frac{5+(-3)}{7} = \frac{2}{7}$$

t. Marka hore tirada lakab ee $\frac{7}{-11}$ ayaan hooseeyaheeda ka dhigaynaa mid togan

$$\frac{7}{-11} = \frac{7 \times (-1)}{-11 \times (-1)} = \frac{-7}{11}$$

$$\frac{-7}{11} + \frac{3}{11} = \frac{-7+3}{11} = \frac{-4}{11}$$

Xaaladda 2aad: Tirooyin Lakab oo kala Hooseeye ah

Marka aan isugeyneyno laba tiro lakab oo kala hooseeye ah, marka hore waxa aan helaynaa dh.y.w hooseeyeyaashooda, kadibna waxa aan hooseeyeyaasha u tibaaxaynaa dhufsane yarihi ay wadaageen waxaana isugeyneynaa labada tiro lakab si lamid ah sidii aan ku baranay xaaladda koowaad.

Tusaalaha 2aad: waxa aan isu geyneynaa tirooyinka lakab ee soo socda:

$$\text{b. } \frac{-3}{5} \text{ iyo } \frac{2}{3}$$

$$\text{t. } \frac{-23}{18} \text{ iyo } \frac{17}{24}$$

Furfuris

b. Dh.y.w 5 iyo 3 waa 15

$$\frac{-3}{5} + \frac{2}{3} = \frac{-3 \times 3}{5 \times 3} + \frac{2 \times 5}{3 \times 5} = \frac{-9}{15} + \frac{10}{15} = \frac{-9+10}{15} = \frac{1}{15}$$

t. Dh.y.w 18 iyo 24 waa 72

$$\frac{-23}{18} + \frac{17}{24} = \frac{-23 \times 4}{18 \times 4} + \frac{17 \times 3}{24 \times 3} = \frac{-92}{72} + \frac{51}{72} = \frac{-41}{72} = \frac{-41}{72}$$

Waxqabadka 2aad

Waxa aan raadinaynaa tirada lakab ee haddii loo geeyo $\frac{-7}{8}$ aan helayno $\frac{4}{9}$.

1.2 .2 Kala Goynta Tirooyinka Lakab

Waxqabadka 3aad

Haddii dhererka waddo ay tahay 1,208 km, halka waddo kalana uu dhererkeedu yahay 0.936 km, haddaba waxa aan helaynaa immisa km ayaa ay dheertahay waddada dheer.

Ka goynta tiro lakab tiro lakab kale, waxa ay la mid tahay u geynta weydaarkeeda.

$$\frac{m}{n} - \frac{r}{s} = \frac{m}{n} + \left(-\frac{r}{s}\right)$$

Tusaalaha 3aad:

b. Ka goo $\frac{3}{8}$ tirada $\frac{-5}{12}$

t. Ka goo $\frac{-7}{24}$ tirada $\frac{5}{8}$

Furfuris

b. Dh.y.w 12 iyo 8 waa 24

$$\frac{-5}{12} - \frac{3}{8} = \frac{-10 + (-9)}{24} = \frac{-19}{24}$$

t. Dh.y.w 24 iyo 8 waa 24

$$\frac{5}{8} - \left(-\frac{7}{24}\right) = \frac{5}{8} + \frac{7}{24} = \frac{15 + 7}{24} = \frac{22}{24} = \frac{11}{12}$$

Waxqabadka 4aad

Haddii cufka ukunta digaaggu yahay 0.05g, haddaba waxa aan raadinaynaa cufka 9 ukumood oo isku mid ah.

1.2 .3 Isku Dhufashada Tirooyinka Lakab

Marka aan dooneyno in aan isku dhufanno laba tiro lakab waxa aan isku dhufanaynaa labada sarreeye iyo labada hooseeye, kadibna taranta sarreeyayaasha ayaa inoo noqonaya sarreeyaha natiijada halka taranta labada hooseeyena ay inoo matali doonto hooseeyaha natiijada.

Haddaba, haddii $\frac{m}{n}$ iyo $\frac{r}{s}$ ay yihiin laba tiro lakab, markaa tarantoodu waxa ay noqonaysaa sidatan:

$$\frac{m}{n} \times \frac{r}{s} = \frac{mr}{ns}$$

FG: Marka tiro lakab lagu dhufto eber, tarantu waxa ay noqonaysaa eber.

$$\frac{m}{n} \times 0 = 0 = 0 \times \frac{m}{n}$$

Tusaalaha 4aad: waxa aan raadineynaa taranta tirooyinka lakab:

b. $\frac{2}{7} \times \left(-\frac{3}{8}\right)$

t. $(-3) \times \left(\frac{4}{-5}\right)$

Furfuris

b. $\frac{2}{7} \times \left(-\frac{3}{8}\right) = \frac{2 \times -3}{7 \times 8} = -\frac{6}{56} = -\frac{3}{28}$

t. $(-3) \times \left(\frac{4}{-5}\right) = \frac{-3 \times 4}{1 \times (-5)} = \frac{-12}{-5} = \frac{12}{5} = 2\frac{2}{5}$

Tusaalaha 5aad: waxa aan raadineynaa taranta tirooyinka lakab ee kala ah $\frac{-2}{3}, \frac{3}{5}$ iyo $\frac{-5}{6}$.

Furfuris

$$\begin{aligned}\frac{-2}{3} \times \frac{3}{5} \times \frac{-5}{6} &= \frac{-2}{3} \times \left(\frac{3}{5} \times \frac{-5}{6} \right) = \frac{-2}{3} \times \left(\frac{3 \times (-5)}{5 \times 6} \right) = \frac{-2}{3} \times \frac{-15}{30} = \frac{30}{90} \\ &= \frac{1}{3}\end{aligned}$$

Waxqabadka 5aad

Waxa aan raadinaynaa bedka beer leh qaab leydi haddii dhererka beertu yahay $3\frac{1}{2}m$ ballaceeduna yahay $2\frac{1}{4}m$.

1.2 .4 Isuqeybinta Laba Tiro Lakab

Marka la isu qeybinayo laba tiro lakab marka hore isu qeybinta ayaa waxaa loo badalaa isku dhufasho ayada oo la qeybshaha lagu dhufanayo rogaalka qeybshaha kadibna waxaa loo maraa jidkii isku dhufashada.

Haddaba, haddii $\frac{m}{n}$ iyo $\frac{r}{s}$ ay yihiin laba tiro lakab, markaa qaybtoodu waxa ay noqonaysaa sidatan:

$$\frac{m}{n} \div \frac{r}{s} = \frac{m}{n} \times \frac{s}{r} = \frac{ms}{nr}$$

Tusaalaha 6aad: waxa aan raadineynaa qaybta tirooyinka lakab ee kala ah:

b. $\frac{4}{9} \div \frac{-5}{9}$

t. $\frac{-5}{6} \div \frac{7}{12}$

Furfuris

b. $\frac{4}{9} \div \frac{-5}{9} = \frac{4}{9} \times \frac{9}{-5} = \frac{4}{-5}$

t. $\frac{-5}{6} \div \frac{7}{12} = \frac{-5}{6} \times \frac{12}{7} = \frac{-60}{42} = \frac{-10}{7}$

Waxqabadka 6aad

Haddii laba tiro lakab ay tarantoodu tahay $\frac{-7}{8}$ middoodna ay tahay $\frac{5}{14}$ waxa aan helayna midda kale.

Waxqabadka 7aad

Waxa aan ka doodaynaa haddii wadarta laba abyoone ay tahay abyoone kale. Haddaba, waa maxay wadarta laba tiro lakab?

Layli

1. Isugee tirooyinka lakab

i. $\frac{4}{7}$ iyo $\frac{5}{7}$

ii. $\frac{7}{-13}$ iyo $\frac{4}{-13}$

iii. $\frac{-11}{17}$ iyo $\frac{23}{17}$

2. Fududee

i. $\frac{5}{11} + 4\frac{3}{9}$

ii. $\frac{-4}{9} + 2\frac{12}{13}$

iii. $\frac{11}{-7} + 8\frac{2}{3}$

3. Raadi wadarta

i. $\frac{4}{5} + \frac{11}{7} + \frac{-7}{5} + \frac{-2}{7}$

ii. $\frac{3}{7} + \frac{4}{9} + \frac{-5}{21} + \frac{2}{3}$

4. Kala goo

i. $\frac{-3}{7} - 2\frac{3}{5}$

ii. $3\frac{5}{8} - \frac{-4}{9}$

iii. $-4\frac{7}{9} - (-3\frac{1}{5})$

5. Raadi taranta tirooyinka lakab

i. $\frac{6}{-7} \times \frac{14}{30}$

ii. $\frac{25}{-9} \times \frac{-3}{10}$

iii. $6\frac{2}{3} \times 1\frac{2}{7}$

iv. $\frac{6}{35} \times (-7)$

v. $\frac{3}{5} \times (\frac{-4}{7} \times \frac{-8}{9})$

vi. $(\frac{2}{-7} \times \frac{-28}{16}) \times \frac{5}{4}$

vii. $\frac{5}{9} \times (\frac{-3}{2} + \frac{7}{5})$

viii. $\frac{-7}{11} \times (\frac{8}{9} - \frac{4}{7})$

6. Isu qeybi tirooyinka lakab

i. $\frac{-3}{7} \div 4$

ii. $4\frac{5}{8} \div (-\frac{4}{9})$

iii. $\frac{-8}{9} \div \frac{-3}{5}$

iv. $(-7) \div \frac{8}{11}$

v. $\frac{-3}{4} \div (\frac{5}{9} \div \frac{-4}{11})$

vi. $(-7 \div \frac{4}{5}) \div \frac{-9}{10}$

vii. $\frac{-7}{24} \div \frac{6}{11}$

1.3 U Tibaaxidda Tiro Lakab Jajab Tobanle ahaan

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

- U badali karaan tiro lakab, jajab tobanle.

Marka aan heysanno tiro lakab oo u qoran $\frac{m}{n}$, waxa aan adeegsanaynaa u qeybinta dheer si aan ugu tibaaxno jajab tobanle ahaan.

Tirooyinka lakab ee tusaalooyinka soo socda haraagoodu waa eber

Tusaalaha 1aad: waxa aan u tibaaxeynaa tirooyinka lakab ee soo socda

jajab tobanle ahaan: b. $\frac{7}{8}$ t. $\frac{21}{25}$ j. $\frac{-87}{32}$

Furfuris

$\frac{7}{8}$	$\frac{21}{25}$	$\frac{-87}{32}$
$\begin{array}{r} 0.875 \\ 8 \overline{) 7.000} \\ \underline{64} \\ 60 \\ \underline{56} \\ 40 \\ \underline{40} \\ 0 \\ \hline \frac{7}{8} = 0.875 \end{array}$	$\begin{array}{r} 0.84 \\ 25 \overline{) 21.000} \\ \underline{200} \\ 100 \\ \underline{100} \\ 0 \\ \hline \frac{21}{25} = 0.84 \end{array}$	$\begin{array}{r} 2.71875 \\ 32 \overline{) 87.00000} \\ \underline{64} \\ 230 \\ \underline{224} \\ 60 \\ \underline{32} \\ 280 \\ \underline{256} \\ 240 \\ \underline{224} \\ 160 \\ \underline{160} \\ 0 \\ \hline \frac{-87}{32} = -2.71875 \end{array}$

FG: Tirooyinka lakab ee caynkaas oo kale ah waxaa loo yaqaanaa jajab tobanleyaal dhamaanaya.

Tirooyinka lakab ee tusaalooyinka soo socda haraagoodu waa uu ka duwan yahay eber

Tusaalaha 2aad: U tibaax tirooyinka lakab ee soo socda jajab tobanle

ahaan:

b. $\frac{-4}{11}$

t. $\frac{11}{75}$

Furfuris

$\frac{-4}{11}$	$\frac{11}{75}$
$ \begin{array}{r} 0.3636... \\ 11 \overline{) 4.0000} \\ \underline{33} \\ 70 \\ \underline{66} \\ 40 \\ \underline{33} \\ 70 \\ \underline{66} \\ 4 \\ \vdots \\ \vdots \end{array} $	$ \begin{array}{r} 0.1466... \\ 75 \overline{) 11.0000} \\ \underline{75} \\ 350 \\ \underline{300} \\ 500 \\ \underline{450} \\ 500 \\ \underline{450} \\ 50 \\ \vdots \\ \vdots \end{array} $

Haddaba, tiro lakab kasta waxa ay leedahay astaamaha hoose:

b. Mid dhammaata.

t. Iyo mid aan dhammaaneyn lakin soo noqnoqota.

Tiro kasta oo laga helo astaamaha kore ama qaar ka mid ah ayaa waxaa loo yaqaanaa tiro lakab.

Waxqabadka 1aad

Marka hore waxa aan helaynaa rogaalka tirada la ina siiyay kadibna waxa aan ku hor qoraynaa teebaa ah mid dhamaanaysa, teebaase ah mid aan dhammaaneyn lakin soo noqnoqonaysa.

Tirada	Rogaalkeeda	Jajab tobanle	Faallo
1			
2			
3			
4			
5			
6			
7			
8			
9			
10	$\frac{1}{10}$	0.1	Dhammaanaysa

1.4 Tirooyinka Lakabka La'

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

- Qeexi karaan tiro lakab la'.
- Tiro lakab la' u tibaaxi karaan jajab tobanle ahaan..

Waxqabadka 1aad

Waxa aan helaynaa saamiga labada cabbir ee kala ah 39.5 sm iyo 24.5 sm kaddibna waxa aan sheegaynaa haddii uu yahay tiro lakab ama lakab la'.

Tirooyinka lakabka la' marka loo tibaaxayo jajab tobanle ahaan ma dhamaadaan mana soo noqnoqdaan.

Tusaale ahaan,

- a. $\pi = 3.14159265358979\dots$,
- b. $0.1011001110001111\dots$
- c. $\sqrt{2} = 1.4142135624\dots$

Tusaalaha 1aad: waxa aan u tibaaxeynaa $\sqrt{3}$ jajab tobanle ahaan.

Furfuris

Maadaama natiijada ay noqotay tiro aan dhamaanayn isla markaana aan soo noqnoqonaynin waa $\sqrt{3}$ waa tiro lakab.

Haddaba, dhammaan xididdada laba jibbaaran ee aan ka imaan laba jibbaraneyaal toos ah waxa ay kid mid yihiin tirooyinka lakabka la'. Sida,

$$\sqrt{2}, \sqrt{3}, \sqrt{5}, \sqrt{7}, \dots$$

Waxqabadka 2aad

Waxa aan u kala soocaynaa tirooyinka kuwooda lakab iyo kuwooda lakabka la'.

$$\sqrt{10}, \sqrt{49}, 0.025, 0.7\bar{6}, 2.505500555\dots, \frac{\sqrt{2}}{2}$$

Tiro lakab la' waa tiro kasta oo aan loo tibaaxi karin sida saamiga caadiga ah ee laba abyoono ama aan loo tibaaxi habka $\frac{m}{n}$.

Tusaalooyin

1. Tirooyinka lakabka la' waxaa ka mid ah $\sqrt{2}, \sqrt{5}, \sqrt{7}, 2\sqrt{3}, \dots$
2. Tirooyinka lakabka la' waxaa kaloo ka mid ah π oo ah saamiga ka dhaxeeya meeriska iyo dhexroorka goobo.

Layli

1. U tibaax tirooyinka lakab ee soo socda saansaanta jajab tobanle

i. $\frac{2}{7}$

ii. $-5\frac{3}{11}$

iii. $\frac{22}{3}$

iv. $\frac{327}{200}$

2. Tirooyinka lakab ee soo socda kuweebaa dhamaanaya kuweebaase dhammaanaynin

i. $\frac{7}{128}$

ii. $\frac{21}{15}$

iii. $4\frac{9}{35}$

iv. $\frac{219}{2200}$

3. Ku muuji tirooyinkaan maangalka ah xarriiqa tirooyinka

i. 5.348

ii. 2.863

1.5 Xididdada Laba Jibbaaran

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

- Heli karaan xididdada laba jibbaaran.
- Ku heli karaan xididdada laba jibbaaran habka isireynta.
- Furfuris karaan xididdada laba jibbaaran ee taranta iyo qeybta

Xididka laba jibbaaran	Faallayn
$\sqrt{1} = 1$	$1^2 = 1$
$\sqrt{4} = 2$	$2^2 = 4$
$\sqrt{9} = 3$	$3^2 = 9$
$\sqrt{16} = 4$	$4^2 = 16$
$\sqrt{25} = 5$	$5^2 = 25$
$\sqrt{36} = 6$	$6^2 = 36$
$\sqrt{49} = 7$	$7^2 = 49$
$\sqrt{64} = 8$	$8^2 = 64$
$\sqrt{81} = 9$	$9^2 = 81$
$\sqrt{100} = 10$	$10^2 = 100$

Waxqabadka 1aad

Waxa aan helaynaa xididka laba jibbaaran ee tirooyinka hoose:

- i. $\sqrt{121}$
- ii. $\sqrt{529}$
- iii. $\sqrt{121}$
- iv. $\sqrt{324}$

Haddii tiro taban la laba jibbaaro waxa ay noqonaysaa mid togan.

Tusaale ahaan,

$$1^2 = 1 \quad \text{sidoo kale } (-1)^2 = 1$$

$$2^2 = 4 \quad \text{sidoo kale } (-2)^2 = 4$$

$$3^2 = 9 \quad \text{sidoo kale, } (-3)^2 = 9, \text{ iwm.}$$

Haddaba, waxa aan oran karnaa tiro kasta oo laba jibbaaran waxa ay yeelataa laba xidid mid togan iyo mid taban. Haseyeeshee, marka aan furfurayno mas'alooyinka xisaabta waxa aan badanaa qaadannaa midda togan.

1.5 .1 Isirrada Mutuxan ee Xidid Laba Jibbaaranayaasha

Waxa aan eegaynaa tusaha hoose si aan u baranno isirrada mutuxan ee xididdada laba jibbaaran.

Tirada	Isirradeeda mutuxan	Laba jibbaarka tirada	Isirrada mutuxan ee laba jibbaaraneyaasha
6	$6 = 2 \times 3$	$6^2 = 36$	$36 = 2 \times 2 \times 3 \times 3$ $= (2 \times 3)^2$
8	$8 = 2 \times 2 \times 2$	$8^2 = 64$	$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$ $= (2 \times 2 \times 2)^2$
12	$12 = 2 \times 2 \times 3$	$12^2 = 144$	$144 = 2 \times 2 \times 2 \times 2$ $\times 3 \times 3$ $= (2$ $\times 2$ $\times 3)^2$
15	$15 = 3 \times 5$	$15^2 = 225$	$225 = 3 \times 3 \times 5 \times 5$ $= (3 \times 5)^2$

Tusaalaha 1aad: waxa aan raadineynaa xididka laba jibbaaran ee 324 annaga oo adeegsanayna habka isirrada mutuxan.

Furfuris

Waxa aan u maraynaa jidka hoose:

1. Raadi isirada mutuxan ee tirada lagu siiyay.
2. Kooxey lammaaneyaasha isirada isleh.

Haddaba,

2	324
2	162
3	81
3	27
3	9
3	3
	1

$$324 = 2 \times 2 \times 3 \times 3 \times 3 \times 3 = 2^2 \times 3^2 \times 3^2 = (2 \times 3 \times 3)^2$$

$$\therefore \sqrt{324} = \sqrt{(2 \times 3 \times 3)^2} = 2 \times 3 \times 3 = 18$$

Tusaalaha 2aad: waxa aan raadineynaa tirada ugu yar ee lagu dhufan karo ama loo qeybin karo tirada 250 si looga yeelo laba jibbaarane qumman, kadibna waxa aan heleynaa xididkeeda laba jibbaaran.

Furfuris

Marka hore waxa aan raadinaynaa isirrada mutuxan ee 250

5	250
5	50
5	10
2	2
	1

$$250 = 5 \times 5 \times 5 \times 2 = 5^2 \times 5 \times 2$$

Waxa aan aragnaa in isirrada mutuxan ee kala ah 5 iyo 2 aysan lahayn isirro lammaane ah, markaa waxa aan tarankooda (10) ku dhufanaynaa ama u qeybineynaa tirada 250.

1. Haddii aan ku dhufanno $250 \times 10 = 2500 = 5^2 \times 5 \times 2 \times 5 \times 2$, haddaba xididka laba jibbaaran ee 2500 waa 50.
2. Haddii aan u qeybinno tirada $250 \div 10 = 25$, haddaba xididka laba jibbaaran ee tirada 25 waa 5.

Waxqabadka 2aad

Waxa aan sheegaynaa haddii ay tirada 108 tahay laba jibbaarane qumman annaga oo adeegsanayna habka isirrada mutuxan.

1.5 .2 Xididka Laba jibbaaran ee Taranta iyo Qaybta Tiro

Laba tiro kasta oo togan m iyo n xididka tarantooda iyo qaybtooda waxaa loo maraa jidka hoose:

$$1. \sqrt{mn} = \sqrt{m} \times \sqrt{n}$$

$$2. \sqrt{\frac{m}{n}} = \frac{\sqrt{m}}{\sqrt{n}} \quad (n \neq 0)$$

Tusaalaha 3aad: waxa aan fududeyneynaa $\sqrt{256}$

Furfuris

$$\sqrt{256} = \sqrt{16 \times 16} = \sqrt{16} \times \sqrt{16} = 4 \times 4 = 16$$

Ama

$$\sqrt{256} = \sqrt{64 \times 4} = \sqrt{64} \times \sqrt{4} = 8 \times 2 = 16$$

Tusaalaha 4aad: waxa aan fududeyneynaa:

$$b. \sqrt{\frac{98}{162}}$$

$$t. \sqrt{2\frac{7}{9}}$$

Furfuris

$$b. \sqrt{\frac{98}{162}} = \sqrt{\frac{2 \times 49}{2 \times 81}} = \sqrt{\frac{49}{81}} = \frac{7}{9}$$

$$t. \sqrt{2\frac{7}{9}} = \sqrt{\frac{25}{9}} = \frac{5}{3} = 1\frac{2}{3}$$

Waxqabadka 3aad

Waxa aan buuxinaynaa meelaha bannaan annaga oo adeegsanayna

xeerka $\sqrt{mn} = \sqrt{m} \times \sqrt{n}$

$\sqrt{36} = 6$	$\sqrt{9} \times \sqrt{4} = 3 \times 2 = 6$
$\sqrt{144}$	
$\sqrt{1225}$	
$\sqrt{144}$	

Layli

1. Raadi laba jibbaarada tirooyinka soo socda:
 - i. 17
 - ii. 203
 - iii. 1098
2. Kuweebaa tirooyinka soo socda ah laba jibbaaranayaal qumman:
 - i. 725
 - ii. 190
 - iii. 841
 - iv. 1089
3. Raadi xidid laba jibbaaranayaasha soo socda adiga oo adeegsanaya habka isiraynta tirooyinka mutuxan.
 - i. 144
 - ii. 256
 - iii. 784
 - iv. 1156
 - v. 4761
 - vi. 9025
4. Raadi tirada ugu yar ee haddii laga gooyo 6666 ay noqonayso laba jibbaarane quman. Sidoo kale, raadi xidid laba jibbaarkeeda.
5. Raadi tirada ugu yar ee haddii lagu dhufto 1800 ay noqonayso laba jibbaarane quman. Sidoo kale, raadi xidid laba jibbaarkeeda.

1.6 Xididdada Saddex Jibbaaran

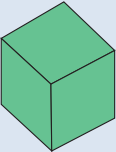
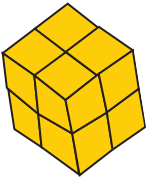
Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

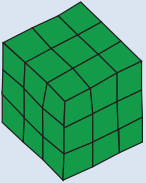
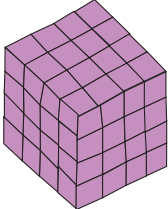
- Raadin karaan saddex jibbaarka tiro.
- Heli karaan xididdada saddex jibbaaran.
- Ku heli karaan xididdada saddex jibbaaran habka isireynta.

1.6 .1 Saddex Jibbaarane

Haddii aad saddex jeer isku dhufato isla tiradii, tirada soo baxda ayaa waxaa loo yaqaan tiro saddex jibbaaran. Haddaba, haddii m ay tahay tiro, saddex jibbaarkeeda waxaa loo qoraa m^3 . Tirooyinka saddex jibbaaran waxaa ka mid ah 1, 8, 27, 64, 125, iwm.

Tusaha hoose ayaa ina tusaya sida lagu heli karo tiro saddex jibbaaran.

Joometeri ahaan	Tarantooda	Qormadooda	Saddex jibbaarane quman
	$1 \times 1 \times 1$	1^3	1
	$2 \times 2 \times 2$	2^3	8

	$3 \times 3 \times 3$	3^3	27
	$4 \times 4 \times 4$	4^3	64

Sidoo kale tusahaan kale ee hoose waxa uu inoo faahfaahinayaa astaamaha tirooyinka saddex jibbaaran ee qumman.

Tir.	Astaanta	Tusaale
1	Saddex jibbaarka tiro togan waa toganyahay	$6^3 = 6 \times 6 \times 6$ $= 216$
2	Saddex jibbaarka tiro taban waa tabanyahay	$(-7)^3$ $= (-7) \times (-7)$ $\times (-7) = -343$
3	Saddex jibbaarka tiro kasta oo dhaban ah waa dhaban	$8^3 = 8 \times 8 \times 8$ $= 512$
4	Saddex jibbaarka tiro kasta oo kisi ah waa kisi	$9^3 = 9 \times 9 \times 9$ $= 729$

1.6 .2 Xidid Saddex Jibbaarane

Xididka saddex jibbaaran waa tirada marka la saddex jibbaaro kusiisa tiradii la haystay. Tusaale ahaan, xididka saddex jibbaaran ee tirada 27 waa 3, waayoo haddii 3^3 waxaa soo baxa 27. Xididka saddex jibbaaran ee tiro m , waxaa loo qoraa $\sqrt[3]{m}$ ama $m^{\frac{1}{3}}$.

Tusaalaha 1aad: waxa aan raadineynaa siddeedda xidid saddex jibbaarane qumman ee ugu horreeya tirooyinka tirsiiimo.

Furfuris

Saddex jibbaaran	Xididka saddex jibbaaran
1	1
8	2
27	3
64	4
125	5
216	6
343	7
512	8

Waxqabadka 1aad

Waxa aan helaynaa xididka saddex jibbaaran ee tirooyinka kala ah 4096, 3375, 2744 iyo 1331.

Tusaalaha 2aad: waxa aan go'aamineynaa in tirada 400 ay tahay saddex jibbaarane qumman iyo in kale.

Furfuris

Waxa aan helaynaa isirrada mutuxan ee tirada 400

$$400 = 2 \times 2 \times 2 \times 2 \times 5 \times 5$$

Haddaba, 400 ma ahan saddex jibbaarane quman waayoo isirka 2 waxa uu usii baahanyahay 2 dheeri ah sidoo kale isirka 5 .

1.6 .3 Habka isirrada Mutuxan ee Xididka Saddex Jibbaarane

Waxa qaadaynaa tallaabooyinka hoose si aan u helno xididka saddex jibbaarane:

1. U tibaax tirada taranta isiradeeda mutuxan.
2. U kooxey saddex saddex isirada is leh.
3. Ka qaado hal saddex

Tusaalaha 3aad waxa aan raadineynaa xididka saddex jibbaaran ee 27000.

Furfuris

$$27000 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 5 \times 5$$

$$\therefore \sqrt[3]{27000} = 2 \times 3 \times 5 = 30$$

Tusaalaha 4aad: waxa aan raadineynaa xididka saddex jibbaaran ee:

b. $\sqrt[3]{\frac{9261}{8000}}$

t. $\sqrt[3]{\frac{1728}{729}}$

Furfuris

b.
$$\sqrt[3]{\frac{9261}{8000}} = \frac{\sqrt[3]{9261}}{\sqrt[3]{8000}} = \frac{(21 \times 21 \times 21)^{\frac{1}{3}}}{(20 \times 20 \times 20)^{\frac{1}{3}}} = \frac{(21^3)^{\frac{1}{3}}}{(20^3)^{\frac{1}{3}}} = \frac{21}{20} = 1 \frac{1}{20}$$

t.
$$\sqrt[3]{\frac{1728}{729}} = \frac{\sqrt[3]{1728}}{\sqrt[3]{729}} = \frac{(12 \times 12 \times 12)^{\frac{1}{3}}}{(9 \times 9 \times 9)^{\frac{1}{3}}} = \frac{(12^3)^{\frac{1}{3}}}{(9^3)^{\frac{1}{3}}} = \frac{12}{9} = \frac{4}{3} = 1 \frac{1}{3}$$

Layli

1. Hubi in tirada 1944 ay tahay saddex jibbaarane quman.
2. Raadi xididka saddex ee $24 \times 36 \times 80 \times 25$.
3. Raadi xididka saddex adiga oo adeegsanaya isirada mutuxan
b. 729 t. 6859
4. Waa maxay xididka laba jibbaaran ee xididka saddex jibbaaran ee 46656?
5. Ku qor (R) ama (B) weerahaan soo socda:
b. Saddex jibbarka tirade 24 waxa ay ku dhamaataa 4.
t. Haddii aan 10^3 ka goyno 1729 waxaa inoo soo baxaya 9^3 .
j. Saddax jibbaarka 0.000001728.
x. R aadi xididka saddex jibbaaranee $24 \times 36 \times 80 \times 25$.

Horudhac

Saynisyahanka reer Faaris ee Khawarizmi ayaa shaaca ka qaaday seedadka (surds) islamarkaana sheegay in ay qeyb ka yihiin xisaabta. Sidoo kale, waxa uu sheegay in tirooyinka lakabka la' ay u shaqeeyaan sida kuwo dhaga la' taasoo mar danbe loo aqoonsaday seed. Haddaba seedadka waxaa loo tarjumay in ay yihiin xididdo aan dhawaaqeyn loona muujin karin habka tirooyinka lakab.

Cutubkaan waxa aan ku baran doonnaa tirooyinka maangalka ah oo ah ururka samaysma markii la'isku biiriyo tirooyinka lakab iyo tirooyinka lakabka la'.

Tusmada Cutubka

Cutubkaan waxa aan ku baran doonnaa casharada hoose:

1. Tiro maangal ah.
2. Isugeynta iyo kala goynta tirooyinka maangalka ah
3. Isku dhufashada iyo isuqeybinta tirooyinka maangalka ah
4. Qiimo sugan
5. Jibbaaro

Ujeedooyinka Cutubka

Dhammaadka cutubkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Qeexaan tiro maangal ah.
2. Furfuri karaan xisaabfallada tirooyinka maangalka ah
3. Adeegsadaan xeerarka tirooyinka maangalka ah.

2.1 Tiro Maangal ah

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

- Qeexi karaan tiro maangal ah.
- Gartaan xirirka ka dhaxeeya tiro lakab iyo tiro maangal ah.
- Ku muujin karaan xarriiqa tirooyinka.

Qeexid: Tirooyinka ka soo baxa midowga ururka tirooyinka lakab iyo ururka tirooyinka lakabka la' ayaa waxaa la yiraahdaa tirooyin maangal ah.

Tirooyinka maangalka ah

Seed: waa xidid (xidid laba jibaarane ama saddax jibbaarana) kaas oo si fudud loogu badali Karin tirooyinka lakab

Tusaalooyinka seed

$\sqrt{2} \rightarrow$ waa tiro seed maxaa yeelay $\sqrt{2} = 1.414...$

$\sqrt{3} \rightarrow$ waa tiro Seed ah.

$\sqrt[3]{5} \rightarrow$ xididka saddax jibbaarane waa seed

Tusaalooyinka soo socda waa xididdo aan seed ahayn:

b) $\sqrt{4}, \sqrt{9}, \sqrt{16}, \sqrt{25}, \sqrt{36}$

t) $\sqrt[3]{27}, \sqrt[3]{8}, \sqrt[3]{125}$.

Tusaalooyin ku saabsan tirooyinka maangalka ah

- Lacagta:** Haddii aad haysatid hanti lacag dhan \$5.75, 5.75 waa tiro maangal ah Faaduma waxa ay daynsatay lacag dhan \$100, 100 waa tiro maangal ah.
- Heerkulka:** Habeen qabow ah heerkulka waxa uu noqdaa -10°C , maalin kululna waxa ay noqotaa 35.5°C , dhammaan -10 iyo 35.5 waa tirooyin maangal ah.
- Fogaanta:** Dugsiga waxa uu ii jiraa fogaan dhan 3.2 km, 3.2 waa tiro maangal ah.
- Joometeri:** Dhererka joogga seddaxagal qumani waa $\sqrt{3}\text{ cm}$, $\sqrt{3}$ waa tiro maangal ah.

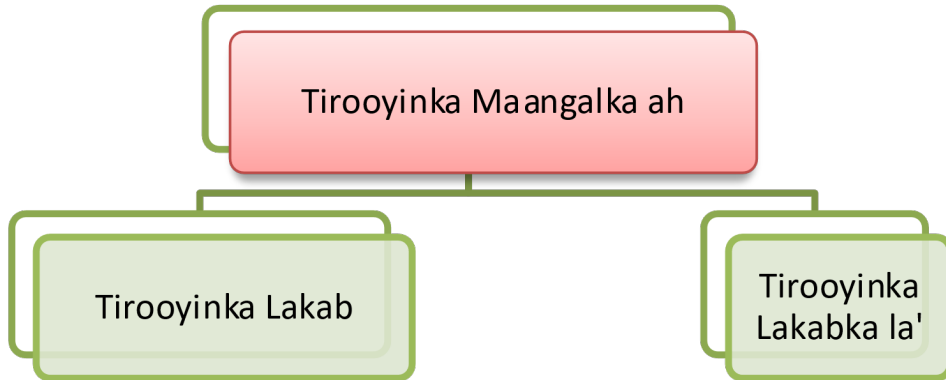
Waxqabadka 1aad

Waxa aan u kala soocaynaa hadba ururka tirooyinka ay ka tirsanyihiin annaga oo raacayna tusaalaha:

Tirada	Tirsiimo	Abyoone	Tirooyin lakab	Tirooyin lakab la'	Tirooyinka maangalka ah
-6	×	√	√	×	√
$1\frac{5}{9}$	×	×			
0					
$0.\overline{23}$					
0.68					
$\sqrt{2}$					
π					
$\frac{2}{5}$					
0.151151115					

Tirooyinka maangalka ah waxa ay ka koobanyihiin dhammaan tirooyinka lakab iyo kuwa lakabka la'.

Shaxanka hoose ayaa ina tusaya sida ay isugu xiranyihiin tirooyinka maangalka ah iyo kuwa lakab.



Xarriiqa Tirooyinka iyo Tirooyinka Maangalka ah

Marka aan dooneyno in aan ku muujinno tiro maangal ah xarriqa tirooyinka marka hore waxa aan tirada la ina siiyay helaynaa labada abyoone oo ay dhax dhacdo, kadibna waxa aan u qeybineyna inta u dhaxaysa 10 qeybood oo siman si aan ugu muujinno tirada hadba innaga oo u eegayna godka ku habboon.

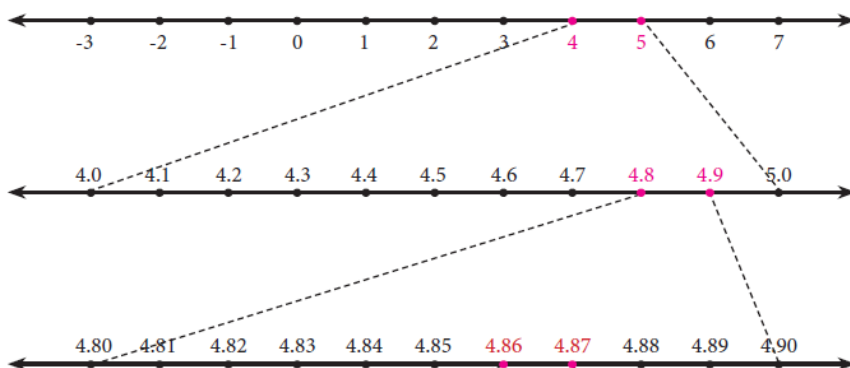
Tusaalaha 1aad: waxa aan ku muujineynaa tirada 4.86 xarriiqa tirooyinka.

Furfuris

Waxa ay tirada 4.86 u dhaxaysaa laba abyoone ee kala ah 4 iyo 5. Haddaba, si aan ugu muujinno xarriiqa tirooyinka waxa aan raacaynaa tallaabooyinkaan hoose:

1. U qeybi fogaanta u dhaxaysa 4 iyo 5 toban qeybood oo isla'eg.
2. Kadibna ku calaamaday 4.8 qeybtii ku habboon 10ka qeybood.

3. Kadibna 4.8 la qaado godka xiga 4.86 islamarkaana u qeybi 10 qeybood inta ay dhaxaysa.
4. Calaamaday 4.86



2.2 Isugeynta iyo Kala goynta Tirooyinka Maangalka ah

Waxqabadka 1aad

Cali ayaa waxa uu aaday xeebta oo ka fog gurigiisa fogaan dhan 2km, misana waxa uu sii socday fogaan dhan $\frac{2}{3}km$ oo dheeri ah si uu usoo gato caano. Haddaba waxa aan raadinayaa wadarta fogaanta ee kusoo laabashadiisa guriga.

Qeexid: Laba tiro kasta oo maangal ah a iyo b wadartoodu waa $a + b$ faraqooduna waa $a - b = a + (-b)$

Waxqabadka 2aad

Waxa aan fududeynaynaa annaga oo eegayna tibxaha isu eg ee

$$\sqrt{45} + 6\sqrt{5} - \sqrt{20} - \sqrt{25}$$

Tusaalaha 1aad: Waxa aan u qoraynaa habka ugu fudud:

$$\sqrt{10} - \sqrt{16} + \sqrt{40}$$

Furfuris

$$\sqrt{10} - \sqrt{16} + \sqrt{40} = \sqrt{10} - 4 + 2\sqrt{10} = (1 + 2)\sqrt{10} - 4 = 3\sqrt{10} - 4$$

Waxqabadka 3aad

Waxa aan helaynaa qiimaha x ee ku jira tirooyinka hoose annaga oo buuxinayna meelaha bannaan:

$$x + \sqrt{2} = \sqrt{50}$$

$$x + \sqrt{2} - \sqrt{2} = \sqrt{50} - \sqrt{2} \text{ sababta } \underline{\hspace{2cm}}$$

$$x + 0 = \underline{\hspace{2cm}} \text{ sababta } \underline{\hspace{2cm}}$$

$$x = \underline{\hspace{2cm}} \text{ sababta } \underline{\hspace{2cm}}$$

Layli

1. Raadi qiimaha una qor habka ugu fudud:
 - b. $1.\overline{91} + (-0.2)$
 - t. $(\sqrt{12} + \sqrt{3})\sqrt{36}$
 - j. $\sqrt{28} - (5\sqrt{7} + \sqrt{63})$
2. Xawaaraha codka waxa uu ku saamoobaa heerkulka jawiga waxaana loo adeegsadaa isla'egta hoose $v = 20\sqrt{273 + ^\circ\text{C}}$ haddaba raadi xawaaraha codka haddii:
 - b. $C = 37^\circ\text{C}$
 - t. $yC = -50^\circ\text{C}$
3. Furfur isla'egyada hoose:
 - b. $x - \sqrt{8} = \sqrt{2}$
 - t. $-1 + x = 2x - \pi$

2.3 Isuqeybinta iyo Isku dhufashada Tirooyinka Maangalka ah

Waxqabadka 1aad

Waxa aan furfuraynaa

$$\sqrt{250} \times \sqrt{90}$$

Tusaalaha 1aad: Waxa aan raadieyna taranta tirooyinka maangalka ah:

$$\frac{1}{2} \times \sqrt{3} \times (12 + \sqrt{12})$$

Furfuris

$$\begin{aligned} \frac{1}{2} \times \sqrt{3} \times (12 + \sqrt{12}) &= \frac{\sqrt{3}}{2} \times (12 + \sqrt{12}) \\ &= \left(\frac{\sqrt{3}}{2} \times 12 \right) + \left(\frac{\sqrt{3}}{2} \times \sqrt{12} \right) \\ &= 6\sqrt{3} + \frac{\sqrt{36}}{2} \\ &= 6\sqrt{3} + 3 \end{aligned}$$

Waxqabadka 2aad

Waxa aan buuxinaynaa annaga oo raacayna tusaalaha la ina siiyay:

1. $\sqrt{18} \div \sqrt{2} = \underline{\hspace{2cm}} \div \sqrt{2} = \frac{3\sqrt{2}}{\sqrt{2}} = \underline{\hspace{2cm}}$

2. $\sqrt{2} \div \sqrt{18} = \underline{\hspace{2cm}}$

Kadibna waxa aan ka doodaynaa haddii $\sqrt{18} \div \sqrt{2}$ la egtahay $\sqrt{2} \div \sqrt{18}$

Waxqabadka 3aad

Waxa aan dhamaystiraynaa meelaha bannaan:

1. $\sqrt{2} \times \sqrt{18} = \sqrt{36} = 6$
2. $\sqrt{3} \times \sqrt{3} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$
3. $(8 - \sqrt{5})(8 + \sqrt{5}) = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

Waxqabadka 4aad

Maxamed iyo Jaamac ayaa furfuray $\frac{18}{3\sqrt{3}}$ waxa ayna u kala mareen jidadka hoose. Haddaba waxa aan sheegaynaa keebaa helay jawaabta ugu saxsan -

Maxamed	Jaamac
$\frac{18}{3\sqrt{3}} = \frac{3 \times 6}{3\sqrt{3}} = \frac{6}{\sqrt{3}}$	$\frac{18}{3\sqrt{3}} = \frac{3 \times 6}{3\sqrt{3}} = \frac{6 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{6\sqrt{3}}{3}$ $= 2\sqrt{3}$

Waxqabadka 5aad

Waxa aan u qoraynaa habka ugu fudud:

1. $\frac{15}{\sqrt{6}} = \frac{15}{\sqrt{6}} \times \frac{\sqrt{6}}{\sqrt{6}} = \underline{\hspace{2cm}}$
2. $\frac{1}{2-\sqrt{7}} = \frac{1}{2-\sqrt{7}} \times \frac{2+\sqrt{7}}{2+\sqrt{7}} = \underline{\hspace{2cm}}$

F.G:

Tirada $2 - \sqrt{7}$ waa waydaarka tirada $2 + \sqrt{7}$

Tusaalaha 2aad: waxa aan raadineynaa qiimaha x ee isla, egta hoose

$$5 + \sqrt{3}x = 2x$$

Furfuris

$$5 + \sqrt{3}x = 2x$$

$$5 + \sqrt{3}x - \sqrt{3}x = 2x - \sqrt{3}x$$

$$5 = 2x - \sqrt{3}x$$

$$5 = (2 - \sqrt{3})x$$

$$x = \frac{5}{2 - \sqrt{3}}$$

$$x = \frac{5(2 + \sqrt{3})}{(2 - \sqrt{3})(2 + \sqrt{3})}$$

$$x = \frac{5(2 + \sqrt{3})}{1}$$

$$1 \times x = 1 \times \frac{5(2 + \sqrt{3})}{1}$$

$$x = 5(2 + \sqrt{3})$$

$$x = 10 + 5\sqrt{3}$$

Layli

1. Raadi qiimaha una qor saansaanta ugu fudud:

b. $\sqrt{2} - \sqrt{8}$

t. $12.5 \times (-\sqrt{0.04})$

j. $\frac{\sqrt{144}}{\sqrt{36}} \times \sqrt{\frac{1}{36}}$

j. $\sqrt{2}(\sqrt{3} + \sqrt{48})$

x. $(2 - \sqrt{3})(2 + \sqrt{3})$

2. U qor habka ugu fudud:

b. $\frac{1}{\sqrt{2}}$

t. $\frac{\sqrt{2}+1}{\sqrt{2}+4}$

j. $\frac{\sqrt{2}-\sqrt{14}}{\sqrt{2}+\sqrt{14}}$

x. $\sqrt{900} \times \frac{1}{30}$

x. $2\sqrt{3}(3\sqrt{12} + 2\sqrt{3})$

3. Furfur

b. $\sqrt{2}x - \sqrt{2} = 2$

t. $3 - \frac{1}{2}x = x + 0.3$

2.4 Qiimo Sugaan

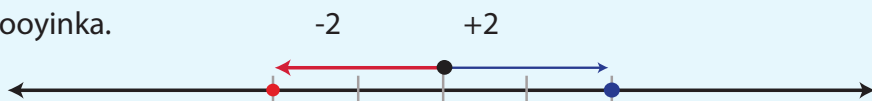
Dhammadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Qeexaan qiime sugan
2. Furfuri karaan isla'egyada ku dhisan qiime sugan

Qeexid: Qiime sugan waa inta ay tiro maangal ahi, a , ka fogtahay eber marla loo eego xarriiqa tirooyinka waxaana lagu suntaa $|a|$.

Waxqabadka 1aad

Waxa aan buuxinaynaa meelaha bannaan annaga oo eegayna xariiqda tirooyinka.



$$|2| = \underline{\hspace{2cm}}$$

$$|-2| = \underline{\hspace{2cm}}$$

Haddaba

$$|+2| = |-2| = \underline{\hspace{2cm}}$$

Waxqabadka 2aad

Waxa aan dhamaystiraynaa meelaha bannaan:

1. $|-3|$
2. $|+7|$
3. $\sqrt{(-3)^2}$
4. $\sqrt{(7)^2}$

F.G:

Haddii x ay tahay tiro maangal ah, haddaba $\sqrt{x^2} = |x|$

Tusaalaha 1aad: Waxa aan raadi qiimaha x ee raaligen karta isla'egta $x^2 = 6$ annaga oo adeegsanayna qiimaha sugan.

Furfuris

$$x^2 = 6$$

$$\sqrt{x^2} = \sqrt{6}$$

$$|x| = \sqrt{6}$$

$$x = \pm\sqrt{6}$$

Layli

1. Raadi qiimaha

b. $|-5|$

t. $|0|$

j. $|1.\bar{6}|$

x. $|4 - 78|$

kh. $|2\sqrt{3} - \sqrt{2}|$

d. $2\left|\frac{\pi}{2}\right|$

2. Keebaa wayn $-\frac{1}{4}|a|$ iyo $\frac{1}{4}|-a|$ haddii a ay tahay tiro maangal ah.

3. Raadi qiimaha x

b. $x^2 = 3$

t. $(x + 7)^2 = 20$

j. $\sqrt{(x + 1)^2} = 6$

2.5 Jibbaarro

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Qeexaan jibbaar
2. Adeegsadaan xeerarka jibbaarrada

Marka aan tirooyinka qaar laba jibbaarayno ama aan saddex jibbaarayno waxa aan adeegsannaa jibbaar. Tusaale ahaan, 25 waxa aan u tibaaxi karnaa 5^2 , 125 waxa aan u tibaaxi karnaa 5^3 .

Haddaba, haddii isir la isku dhufto dhowr jeer ama isku dhufashada ay soo noqnoqoto waxaa loo yaqaanaa habka loo soo gaabiyo **jibbaar**. Tusaale ahaan, $5 \times 5 = 5^2$, tirada 5 waxaa loo yaqaan **sal**, halka 2dana loo yaqaan **muujiye**.

2.5 .1 Jibbaarada Leh Muujiye Togan

Jibbaarrada tusaalooyinka hoose waxa ay leeyihiin muujiyeyaal togan.

Tusaalaha 1aad: Waxa aan raadinaynaa jibbaarrada tirada 2 min 1 ilaa 10.

Furfuris

$$2^1 = 2$$

$$2^2 = 2 \times 2 = 4$$

$$2^3 = 2 \times 2 \times 2 = 8$$

$$2^4 = 2 \times 2 \times 2 \times 2 = 16$$

$$2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 32$$

$$2^6 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 64$$

$$2^7 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 128$$

$$2^8 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 256$$

$$2^9 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 512$$

$$2^{10} = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 1024$$

Waxqabadka 1aad

Waxa aan raadinaynaa qiimaha 2^{100} .

2.5 .2 Jibbaarrada Leh Muujiyeyaal Taban iyo Jibbaarada Leh Muujiyeyaal eber ah

Tiro kasta oo eber lagu jibbaaray waxa ay la egtahay 1. Haddaba, $m^0 = 1, m \neq 0$.

Dhanka kale haddii aan tiro ku jibbaarno tiro taban waxa aan helaynaa rogaalka tiradii la jibbaaray.

$$m^{-x} = \frac{1}{m^x}, x \text{ waa abyooone}$$

Tusaalaha 2aad

$$2^3 = 8$$

$$2^2 = 4$$

$$2^1 = 2$$

$$2^0 = 1$$

$$2^{-1} = \frac{1}{2}$$

$$2^{-2} = \frac{1}{4}$$

2.5 .3 Xeerarka Jibbaarrada

Haddii tirada ay ku jibbaarantahay tiro togan waxa ay muujinaysaa inta jeer ee aan u adeegsan karno tiradaas iskudhufashada, halka tirada leh jibbaar taban ay inoo muujinayso inta jeer ee aan tiradaas u adeegsan karno isuqeybinta. Haddaba, xeerarka ugu muhiimsan jibbaarrada waxaa ka mid ah:

Xeerka Taranta

Marka aan dooneyno in aan isku dhufanno jibbaaranayaal isku salal ah waxa aan isu geyneynaa muujiyeyaasha salalkana mid ayaan kasoo qaadanaynaa.

$m^x \times m^y = m^{x+y}$, halka $m \neq 0$, x iyo y-na ay yihiin abyooneyaal.

Tusaalaha 3aad: Annaga oo adeegsanayna xeerka isku dhufashada ee jibbaaranayasha, waxa aan fududeyneynaa:

- a. $2^3 \times 2^2$
- b. $(-2)^{-4} \times (-2)^{-3}$

Furfuris

- a. $2^3 \times 2^2 = 2^{3+2} = 2^5$
- b. $(-2)^{-4} \times (-2)^{-3} = (-2)^{-4-3} = (-2)^{-7}$

Waxqabadka 2aad

Waxa aan fududeynaynaa $(-5)^{-3} \times (-5)^3$ annaga oo adeegsanayna xeerka isku dhufashda.

Xeerka Qeybta

Marka la isu qeybinayo jibbaaro leh salal isku mid ah waxa aan kala jaraynaa muujiyeyaashooda salalkana mid ayaan ka qaadanayna.

$m^x \div m^y = m^{x-y}$, ama $\frac{m^x}{m^y} = m^{x-y}$, halka $m \neq 0$, x iyo y-na ay yihiin abyooneyaal.

Tusaalaha 4aad: Waxa aan fududeynaynaa jibbaarrada hoose.

b. $\frac{(-3)^5}{(-3)^2}$

t. $\frac{(-7)^{100}}{(-7)^{98}}$

Furfuris

b. $\frac{(-3)^5}{(-3)^2} = (-3)^{5-2} = (-3)^3 = -27$

t. $\frac{(-7)^{100}}{(-7)^{98}} = (-7)^{100-98} = (-7)^2 = 49$

Xeerka Jibbaarka

Marka jibbaarane tiro kale lagu sii jibbaaro waxa aan isku dhufanaynaa jibbaarrada.

$(m^x)^y = m^{xy}$, halka $m \neq 0$, x iyo y na ay yihiin abyooneyaal

Tusaalaha 5aad: Waxa aan fududeynaynaa jibbaarka jibbaaran $[(-2)^3]^2$

Furfuris

$$[(-2)^3]^2 = (-2)^{3 \times 2} = (-2)^6$$

Tusaalaha 6aad: Koridda bakteeriyada

Koritaanka Bakteeriya ayaa lablaabanta saacad kasta. Haddii hal bakteeriya lagu bilaabo, haddaba immisa bakteeriya ayaa sameysantay 5 saac kadib?

Furfuris

Saacad kasta bakteeriyada waxa ay u taagantahay = jibbaarka 2

Tirada bakteeriyada = 25

Tusaalaha 7aad: Beerta nasashada ayaa leh qaabka labajibaaarane, dhinaciisu yahay 12sm, haddaba waxa aan soo saareynaa bedka beerta.

Furfuris

Bedka labajibaarane = dhinac x dhinac

$$= 12sm \times 12sm = 144sm^2$$

2.5 .4 Qormo Saynis

Tiradu marka ay u qorantahay saansaanta caadiga ah waxa an u qori karnaa qormo saynis ahaan.

Adeegsiga qormo saynis waxaa loo aaneeyaa in cilmiga bayolajiga iyo culuumta kale qaarkood ay u baahanyihiin xaddiyo ku cabbiran tiro aad yar ama aad u wayn.

Qormo saynis waxaa loo tibaaxi karaa tiro u dhaxaysa 1 ilaa 10 oo lagu dhuftay jibbaarka toban. Haddii muujiyaha jibbaarku yahay mid togan dhibicdu waxa ay u durugtaa dhanka midig, haddii aysa tahay mid taban waxa ay u dhaqaaqdaa dhanka bidix.

Tusaalaha 6aad: Tusaha hoose waxa uu ina tusayaa sida ay u shaqeeyso qormo saynis.

Saansaanta caadiga ah	Qormo saynis	Saansaanta caadiga ah	Qormo saynis
0.00123	1.23×10^{-3}	123	1.23×10^2
0.0123	1.23×10^{-2}	1230	1.23×10^3
0.123	1.23×10^{-1}	12300	1.23×10^4
1.23	1.23×10^0	123000	1.23×10^5
12.3	1.23×10^1	1230000	1.23×10^6

Tusaalaha 7aad: Haddii dhexroorka dhulku yahay 12,756,000 *miles*, haddaba waxa aan u tibaaxeynaa qormo saynis ahaan.

Furfuris

$$12756000 \text{ mile} = 1.2756 \times 10^7$$

Tusaalaha 8aad: Haddii cabbirka bakteeriya uu yahay 0.00000085 *mm* haddaba, waxa aan u qoreynaa qormo saynis ahaan.

Furfuris

$$0.00000085 \text{ mm} = 8.5 \times 10^{-7} \text{ mm}$$

Layli

1. Fududee:

b. 4^{-3}

t. $\frac{1}{2^{-3}}$

j. $(-2)^5 \times (-2)^{-3}$

X. $\frac{3^2}{3^{-2}}$

2. Fududee adiga oo jawaabta u qoraya jibbaar ahaan:

b. $(3^5 \div 3^8)^5 \times 3^{-5}$

t. $(-3)^4 \times \left(\frac{5}{3}\right)^4$

3. Raadi qiimaha xarafka x eek u jira $(-7)^{x+2} \times (-7)^5 = (-7)^{10}$

4. Fududee qormooyinkaan saynis ee hoose

b. $(7 \times 10^2)(5.2 \times 10^7)$

t. $(3.7 \times 10^5)(2 \times 10^{-3})$

5. U tibaax saansanta caadiga ah

b. 2.27×10^4

t. 1.86×10^5

$$j. 2 \times 10^4$$

6. U tibaax qormo saynis

b. 0.000012005

t. 4312.345

j. 0.10524

x. 123.456

kh. 467800000000

d. 0.000001972

r. 1,083,000,000,000

sh. 0.0000000000000000000000000000000016

Cutubka 3aad: Aljabrada

$$\begin{aligned} &x^2, 3y, 3a^2b^2, 4x, x^2y, 9p^2, \\ &-3y, 4ba^2, 9ab, 7q, 8p, -25x \\ &-5x^2, 2x, 9x^2y, -9p^2, qp^2, 2xy^2 \\ &-10p^2, q, 3y^2x, \frac{2}{3}p, -x^2, a^2b^2 \\ &-ab, a^2b, 2ba, m^3n^2, 5m^3n^2 \end{aligned}$$

Horudhac

Sanadkii hore waxa aan kusoo baranay aasaasiyaadka aljebrada, sida doorsoome, madoorsoome tibxo isu eg iyo tibxo kala duwan, wehliye iyo oraah aljebreed. Waxaa kaloo an soo baranay xisaabfallada tibxaha fudud. Cutubkaan waxa uu sii fidin doonaa xisaabfallada aljebrada waxa uuna xoogga saari doonaa isku ururinta tibxaha iyo fidintooda gaar ahaan kudhufashada iyo isuqeybinta ee oraahda iyo midaalada aljebreed.

Tusamada Cutubka

Cutubkaan waxa aan ku baran doonnaa casharada soo socda:

1. Xisaab fallada tibxaha aljebra
2. Miidaallada aljebreed
3. Isla'egyada aljebra
4. Isla'egyada fudud iyo kuwa wada jira.
5. Mas'alooyinka la xariira nolosha.

Ujeedooyinka Cutubka

Dhammaadka cutubkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Isugeyn karaan islamarkaana kala goyn karaan oraah aljebreedyada.
2. Isku dhufan karaan islamarkaana isuqeybin karaan oraah aljebreedyada.
3. Furfuri karaan midaallada kala ah $(a + b)^2$, $(a - b)^2$, $(a^2 - b^2)$ iyo $(x + a)(x + b)$.
4. Furfuri karaan midaallada kala ah $(a + b)^3$, $(a - b)^3$, iyo $(x + a)(x + b)(x + c)$.
5. Furfuri karaan mas'alooyinka aljebra.
6. Furfruri karaan isla'egyada toosan iyo isla'egyada wada jira.

3.1 Isugeynta Iyo Kala Goynta oraah Aljebreedyada

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Isugeyn karaan oraahyada aljebreed.
2. Kala goyn karaan oraahyada aljebreed.

Tusaalaha 1aad: Adan waxa uu soo iibsaday $3x$ qalimaan ah, ka dib waxa uu soo iibsaday $5x$ qalin oo dheeraad ah, haddaba waxa aan raadineynaa wadarta qalimaanta uu haysto.

Furfuris

$$3x + 5x = 8x \text{ qalimaan ah}$$

Tusaalaha 2aad: Baabuur ayaa waxa uu jaray fogaan dhan 60 km aroortii, waxa uu jaray fogaan kale oo dhan 40 km fiidkii, haddaba waxa aan raadineynaa wadarta fogaanada uu baabuurku jaray.

Furfuris

$$\text{Wadarta fogaanta} = 60 \text{ km} + 40 \text{ km} = 100 \text{ km}$$

Waxqabadka 1aad

Ganacsade ayaa helay faaido dhan $500x + 300$ bisha janaayo, kadib waxa uu helay faaida dhan $200x + 150$ bisha feebaraayo. Haddaba waa immisa wadarta faaidooyinka labada bilood?

Waxqabadka 2aad

Maxamed waxa uu haystaa tiro rooti ah, Falisna waxa ay dheertahay Maxamed 20 xabo. Faarax ayaa yiri labadiinaba 3 ayaan idin sii dheerahay. Haddaba, waxa aan raadinaynaa tirada rootiga ee uu Maxamed haysto.

Marka aan isugeyneyno oraahyo aljebraad waxa aan marka hore kooxayneynaa tibxaha isu eg kadib ayaan isugeyneynaa tibxaha isu'eg ama kala goyneynaa

Waxqabadka 3aad

Waxa aan isugeynaynaa tibxaha la ina siiyay:

1. $3y, 14y$
2. $m, 12m, 21m$
3. $11btj, 5btj$
4. $12n, -n$
5. $4x, 2x, -7x$

Tusaalaha 1aad: Waxa aan is geyneynaa oraahyadan aljabra

1. $rq - 1$ iyo $3rq + 2$
2. $8x + 3$ iyo $1 - 7x$

Furfuris

$$\begin{aligned} 1) (rq - 1) + (3rq + 2) &= (rq + 3rq) + (-1 + 2) \\ &= (1 + 3)rq + 1 \\ &= 4rq + 1 \end{aligned}$$

$$\begin{aligned} 2) (8x + 3) + (1 - 7x) &= 8x + 3 + 1 - 7x \\ &= (8x - 7x) + (3 + 1) \\ &= (8 - 7)x + 4 \\ &= x + 4. \end{aligned}$$

Tusaalaha 2aad: Waxa aan kala goyneynaa oraahyadan aljabra:

i) $11rq - 7rq$

ii) $a - (-a)$

iii) $(21x + 9) - (5x + 7)$

Furfuris

i) $11rq - 7rq$.

$$= 11rq + (-7rq) = 11rq - 7rq = (11 - 7)rq = 4rq$$

ii) $a - (-a)$.

$$= a + a = 2a$$

iii) $21x + 9 - (5x + 7)$

$$= (21x + 9) + [- (5x + 7)] = (21x + 9) - (5x + 7)$$

$$= 21x + 9 - 5x - 7 =$$

$$= (21 - 5)x + (9 - 7)$$

$$= 16x + 2.$$

Waxqabadka 4aad

Waxa aan sheegaynaa sababta ay sidan ku timid:

$$3x + (y - x) = 3x + y - x.$$

Haseyeeshee,

$$3x - (y - x) \neq 3x - y - x.$$

Tusaalaha 3aad: Waxa aan fududeyneynaa:

$$100x + 99y - 98m + 10x + 10y + 10m - x - y + m$$

Furfuris

Marka hore waxa aan isugeyneynaa tibxaha isu'eg

$$\begin{aligned}100x + 99y - 98m + 10x + 10y + 10m - x - y + m &= \\&= (100x + 10x - x) + (99y + 10y - y) + (-98m \\&\quad + 10m + m) \\&= (100 + 10 - 1)x + (99 + 10 - 1)y + (-98 + 10 \\&\quad + 1)m \\&= (110 - 1)x + (109 - 1)y + (-98 + 11)m \\&= 109x + 108y + (-87)m \\&= 109x + 108y - 87m.\end{aligned}$$

Tusaalaha 4aad:

- i) Waxa aan isu geyneynaa: $3x - 4y + m$ iyo $2x - m + 3y$
- ii) Waxa aan kala goyneynaa: $(4x + 3y) - (2x - 5y)$

Furfuris

$$\begin{aligned}\text{i) } (3x - 4y + m) + (2x - m + 3y) &= \\&= (3x + 2x) + (-4y + 3y) + (m - m) \\&= (3 + 2)x + (-4 + 3)y + (1 - 1)m \\&= 5x - 1y + 0m \\&= 5x - y.\end{aligned}$$

$$\begin{aligned}\text{ii) } (4x + 3y) - (2x - 5y) &= \\&= (4x + 3y) + (-2x + 5y) \\&= (4x - 2x) + (3y + 5y) \\&= (4 - 2)x + (3 + 5)y \\&= 2x + 8y.\end{aligned}$$

Tusaalaha 5aad: Waxa aan isu geyneynaa: $5x^2 + 3x - 8, 4x + 7 - 2x^2$ iyo $6 - 5x + 4x^2$.

Furfuris

$$\begin{array}{r} 5x^2 + 3x - 8 \\ -2x^2 + 4x + 7 \\ \hline 4x^2 - 5x + 6 \\ 7x^2 + 2x + 5 \end{array}$$

Tusaalaha 6aad: Waxa aabn isu geyneynaa:

$$8x^2 - 5xy + 3y^2, 2xy - 6y^2 + 3x^2 \text{ iyo } y^2 + xy - 6x^2$$

Furfuris

$$\begin{array}{r} 8x^2 - 5xy + 3y^2 \\ 3x^2 + 2xy - 6y^2 \\ \hline -6x^2 + xy + y^2 \\ 5x^2 - 2xy - 2y^2 \end{array}$$

Tusaalaha 7aad: Waxa aan kala goyneynaa:

$$(6a - 3b + c) - (4a + 5b - 3c)$$

Furfuris

Marka hore waxa aan ku dhufanaynaa summadda taban tibxaha ku jira bisha ee danbe kadib ayaa waxa adeegsanaynaa isugeyn.

$$\begin{array}{r} (6a - 3b + c) - (4a + 5b - 3c) \\ = (6a - 3b + c) + (-4a - 5b + 3c) \\ +6a - 3b + c \\ \hline -4a - 5b + 3c \\ \hline +2a - 8b + 4c \end{array}$$

Tusaalaha 8aad: Waxa aan kala goyneynaa:

$$(5 + x - 2x^2) - (3x^2 - 6x - 4)$$

Furfuris

Marka hore waxa aan ku dhufanaynaa summadda toban tibxaha danbe kadibna waxa aan adeegsanaynaa isugeyn.

$$\begin{aligned}(5 + x - 2x^2) - (3x^2 - 6x - 4) \\&= (5 + x - 2x^2) + (-3x^2 + 6x + 4) \\&\quad -2x^2 + x + 5 \\&\quad \underline{-3x^2 + 6x + 4} \\&\quad \underline{-5x^2 + 7x + 9}\end{aligned}$$

3.2 Tibxaalayaal

Tibxaalayaashu waa weedho xisaabeed oo ka kooban doorsoomayaal jibbaarro togan leh iyo madoorsoomayaal. Waxa ayna leeyihiin xisaabfallada isugeynta, kala goynta, iskudhufashada iyo isuqeybinta.

Waxqabadka 1aad

Waxa aan buuxinaynaa tusaha hoose annaga oo raacayna tusaalaha.

Tirsi	Oraah	Tibxaale / Tibxaale ma aha	Sababta
1	$4y^3 + 2y^2 + 3y + 6$	Tibxaale	Jibbaarrada togan
2	$4x^{-4} + 5x^4$		
3	$m^2 + \frac{4}{5}m + 8$		
4	$\sqrt{5}y^2$		
5	$2r^2 + 3r - 1 + \frac{1}{r}$		
6	$8 + \sqrt{q}$		
7	$\sqrt{8}p^2 + 5p - 7$		
8	$5n^{\frac{4}{5}} + 6n - 1$		

Habka Beegaalka ah ee Tibxaalayaasha

Marka tibxaalayaasha loo qoro habka horsanaanta degata ama fanata ayaa waxa aan oraneynaa waxaa loo tibaaxay habka beegalka ah.

Tusaale

Tibxaalayaasha hoose waxa ay u tibaaxanyihiin habka beegalka ah:

1. $8x^4 + 4x^3 - 7x^2 - 9x + 6$
2. $5 - 3y + 6y^2 + 4y^3 - y^4$

Waxqabadka 2aad

Waxa aan u qoraynaa habka beegalka ah tibxaalayaasha soo socda:

Tirsi	Tibxaale	Habka beegalka ah
1	$5m^4 - 3m + 7m^2 + 8$	
2	$\frac{2}{3}y + 8y^3 - 12 + \sqrt{5}y^2$	
3	$12p^2 - 8p^3 - 10p^4 - 7$	

Tusaha hoose waxa uu ina siinayaa faahfaahin la xariirya tibxaalayaasha si guud:

Tibxaalayaal	waa oraah aljebraadkasta oo ka kooban laba tibix iyo wixii ka badan. Tusaale ahaan, $a^2 + 2ab + b^2, \quad 4x^2 + 3x - 7$
Hal tibxaale	oraah aljebraad kasta oo ka kooban hal tibix ayaa waxaa loo yaqaanaa hal tibxaale. Tusaale ahaan,

	$4x, 3x^2y, -2y^2$
Laba tibxaale	Oraah aljebraad kasta oo ka kooban keliya laba tibix, ayaa loo yaqaanaa labo tibxaale. Tusaale ahaan, $2x + 3, 5y^2 + 9y, a^2b^2 + 2b$
Saddex tibxaale	Oraah aljebraadkasta oo ka kooban saddex tibix ayaa loo yaqaanaa saddex tibxaale. Tusaale ahaan, $2a^2b - 8ab + b^2, m^2 - n^2 + 3$

Tusaalaha 1aad: Laydh ayaa dhererkiisu yahay $(x+5)m$, ballaciisuna yahay $(x-2)m$, waa maxay bedka laydhiga?

Furfuris

Bedka= dherer x ballaca

$$\text{Bedka} = (x + 5)m \times (x - 2)m = x^2 - 2x + 5x - 10 = x^2 + 3x - 10$$

Waxqabadka 3aad

Carwada telefoonada BTJ ayaa waxa ay iibisay tiro x mobeel ah , waxa ay ka heshay $200x$ moobeelada yaryar, $300x^2$ na moobeelada ismaartiga ah, waxa ka baxay qarash dhan 100 , waxa aan raadineynaa faaidada.

Layli

1. Kala goo:

- i. $ka\ goo\ 4k\ tibixda\ 12k$
- ii. $ka\ goo\ 15q\ tibixda\ 25q$
- iii. $Kagoo\ 7xym\ tibixda\ 17xym.$
- iv. $ka\ goo\ 3a^2b\ tibixda\ -5a^2b$
- v. $ka\ goo\ -2abc\ tibixda\ -8abc$
- vi. $ka\ goo\ 2a - 5b + 2c - 9\ tibixda\ 3a - 4b - C + 6$
- vii. $Ka\ goo\ -6p + q + 3r + 8\ tibixda\ m - 2q - 5r - 8$
- viii. $Ka\ goo\ x^3 + 3x^2 - 5x + 4\ tibixda\ 3x^3 - x^2 + 2x - 4$
- ix. $ka\ goo\ 5y^4 - 3y^3 + 2y^2 + y - 1\ tibixda\ 4y^4 - 2y^3 - 6y^2 - y + 5$
- x. $ka\ goo\ 4m^2 + 5q^2 - 6r^2 + 7\ tibixda\ 3m^2 - 4q^2 - 5r^2 - 6$

2. Isugee:

- i. $7p + 6q, 5p - q, q + 16p$
- ii. $a + 5b + 7c, 2a + 10b + 9c$
- iii. $mn + t, 2mn - 2t, -3t + 3mn$
- iv. $u + v, u - v, 2u + 5v, 2u - 5v.$
- v. $5xyz - 3xy, 3zxy - 5yx$
- vi. $8ab, -5ab, 3ab, -ab$
- vii. $7x, -3x, 5x,$
- viii. $3a - 4b + 4c, 2a + 3b - 8c, a - 6b + C$

- ix. $5x - 8y + 2m, 3m - 4y - 2x, 6y - z - x$ iyo $3x - 2m - 3y$
- x. $bax - 2by + 3cm, 6by - 11ax - cm$ iyo $10cm - 2ax - 3by$
- xi. $2x^3 - 9x^2 + 8, 3x^2 - 6x - 5, 7x^3 - 10x + 1$ iyo $3 + 2x - 5x^2 - 4x^3$
- xii. $6m + 4q - 5 + 3, 2r - 5m - 6, 11q - 7m + 2r - 1$ and $2q - 3r + 4$
- xiii. $4x^2 - 7xy + 4y^2 - 3, 5 + 6y^2 - 8xy + x^2$ iyo $6 - 2xy + 2x^2 - 5y^2$

3. Fududee

- (i) $(x + y - t) + (3x - 5y + 7t) - (14x + 7y - 6t)$
- (ii) $m + m + 2 + m + 3 - m - 4 - m - 5 + m + 10$
- (iii) $n + (m + 1) + (n + 2) + (m + 3) + (n + 4) + (m + 5)$

4. Ma ku tilmaami karnaa tibxaale? Sheeg Sababta.

- i. $\frac{1}{x^2} + 3x - 4$
- ii. $x^2(x - 1)$
- iii. $\frac{1}{x}(x + 5)$

5. U qor habka beegalka ah:

- i. $x - 9 + \sqrt{7}x^3 + 6x^2$
- ii. $\sqrt{2}x^2 - \frac{7}{2}x^4 + x - 5x^3$
- iii. $7x^3 - \frac{6}{5}x^2 + 4x + 1$
- iv. $y^2 + \sqrt{5}y^3 - 11 - \frac{7}{3}y + 9y^4$

3.3 Isku Dhufashada Iyo Isu Qeybinta Oraah Aljebraadka

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. isku dhufaan tibxaha aljebraada.
2. Isuqeybiyaan tibxaha aljebraada.
3. Furfuraan mas'alooyinka aljebraad.

3.3 .1 Iskudhufashada tibxaalayaasha

Marka hore inta aanan raadin taranta tibxaalayaasha, waxa aan eegaynaa tallaabooyinka hoose:-

1. Marka aan isku dhufanayno laba tibix oo wada togan ama wada taban tarantoodu waa ay togantahay.
2. Sidoo kale, taranta laba tibix oo kala summad ah waa ay tabantahay.
3. Haddii x ay tahay doorsoome m iyo n ay yihiin abyoonayaal togan. Haddaba, $(x^m \times x^n) = x^{m+n}$, tusaale ahaan, $(x^3 \times x^5) = x^{3+5} = x^8$.

Tusaalaha 1aad: Waxa aan raadineynaa taranta:

b. $6xy$ iyo $-3x^2y^3$ t. $7ab^2, -4a^2b$ iyo $-5abc$

Furfuris

$$\begin{aligned} \text{b. } 6xy \times -3x^2y^3 &= \{6 \times (-3)\} \times \{xy \times x^2y^3\} \\ &= -18x^3y^4 \end{aligned}$$

$$\begin{aligned} \text{t. } (7ab^2) \times (-4a^2b) \times (-5abc) \\ &= \{7 \times (-4) \times (-5)\} \times \{ab^2 \times a^2b \times abc\} \\ &= 140a^{1+2+1}b^{2+1+1}c = 140a^4b^4c \end{aligned}$$

Tusaalaha 2aad: Waxa aan raadineynaa taranta:

1. $5a^2b^2 \times (3a^2 - 4ab + 6b^2)$
2. $(-3x^2y) \times (4x^2y - 3xy^2 + 4x - 5y)$

Furfuris

$$\begin{aligned} 1. \quad & 5a^2b^2 \times (3a^2 - 4ab + 6b^2) \\ &= (5a^2b^2) \times (3a^2) + (5a^2b^2) \times (-4ab) + (5a^2b^2)(6b^2) \\ &= 15a^4b^2 - 20a^3b^3 + 30a^2b^4. \end{aligned}$$

$$\begin{aligned} 2. \quad & (-3x^2y) \times (4x^2y - 3xy^2 + 4x - 5y) \\ &= (-3x^2y) \times (4x^2y) + (-3x^2y) \times (-3xy^2) + (-3x^2y) \times (4x) \\ &\quad + (-3x^2y) \times (-5y) \\ &= -12x^4y^2 + 9x^3y^3 - 12x^3y + 15x^2y^2. \end{aligned}$$

Tusaalaha 3aad: Waxa aan isku dhufaneynaa: $(3x + 5y)$ iyo $(5x - 7y)$.

Furfuris

$$\begin{aligned} (3x + 5y) \times (5x - 7y) &= 3x \times (5x - 7y) + 5y \times (5x - 7y) \\ &= 3x \times 5x - 3x \times 7y + 5y \times 5x - 5y \times 7y \\ &= (15x^2 - 21xy) + (25xy - 35y^2) \\ &= 15x^2 - 21xy + 25xy - 35y^2 \\ &= 15x^2 + 4xy - 35y^2 \end{aligned}$$

Tusaalaha 4aad: waxa aan isku dhufaneynaa:

$$(3x^2 + y^2) \text{ iyo } (2x^2 + 3y^2).$$

Furfuris

$$\begin{aligned} (3x^2 + y^2)(2x^2 + 3y^2) &= 3x^2(2x^2 + 3y^2) + y^2(2x^2 + 3y^2) \\ &= 6x^4 + 9x^2y^2 + 2x^2y^2 + 3y^4 = 6x^4 + 11x^2y^2 + 3y^4 \end{aligned}$$

Tusaalaha 5aad: Waxa aan isku dhufaneynaa: $(5x^2 - 6x + 9)$ iyo $(2x - 3)$

Furfuris

$$\begin{aligned}(5x^2 - 6x + 9)(2x - 3) &= 5x^2(2x - 3) - 6x(2x - 3) + 9(2x - 3) \\ &= 10x^3 - 15x^2 - 12x^2 + 18x + 18x - 27 \\ &= 10x^3 - 27x^2 + 36x - 27\end{aligned}$$

Tusaalaha 6aad: Waxa aan raadineynaa taranta:

$$(2x^2 - 5x + 4)(x^2 + 7x - 8)$$

Furfuris

$$\begin{aligned}(2x^2 - 5x + 4)(x^2 + 7x - 8) &= 2x^2(x^2 + 7x - 8) - 5x(x^2 + 7x - 8) + 4(x^2 + 7x - 8) \\ &= 2x^4 + 14x^3 - 16x^2 - 5x^3 - 35x^2 + 40x + 4x^2 + 28x - 32 \\ &= 2x^4 + 9x^3 - 47x^2 + 68x - 32\end{aligned}$$

Waxqabadka 1aad

Waxa aan isku dhufaneynaa $(2x^3 - 5x^2 - x + 7)$ iyo $(3 - 2x + 4x^2)$

3.3 .2 Iskuqeybinta tibxaalayaasha

Marka hore inta aanan raadin qeybta tibxaalayaasha, waxa aan eegaynaa tallaabooyinka hoose:-

1. Marka aan isku qeybinayno laba tibix oo wada togan ama wada taban qeybtoodu waxa ay noqonaysaa mid togan.
2. Sidoo kale, qeybta laba tibix oo kala summad ah waxa ay noqonaysaa mid taban.

3. Haddii x ay tahay doorsoome m iyo n ay yihiin abyooneyaal togan.

Haddaba, $(x^m \div x^n) = x^{m-n}$, tusaale ahaan, $(x^5 \div x^3) = x^{5-3} = x^2$.

Haddaba marka aan laba tibix isu qeybineyno waxa aan isuqeybineynaa labadooda wehliye kadibna waxa aan ku dhufanaynaa isuqeybinta laba tibxaha.

Tusaalaha 1aad: Waxa aan isu qaybineynaa: $8x^2y^3$ tibixda $-2xy$

Furfuris

$$8x^2y^3 \div -2xy = \frac{8x^2y^3}{-2xy} = \left(\frac{8}{-2}\right)x^{(2-1)}y^{(3-1)} = -4xy^2$$

Tusaalaha 2aad: Waxa u qaybineynaa $-15x^3ym^3$ tibixda $-5xym^2$

Furfuris

$$\frac{-15x^3ym^3}{-5xym^2} = \left(\frac{-15}{-5}\right)x^{3-1}y^{1-1}m^{3-2} = 3x^2y^0m = 3x^2m$$

Tusaalaha 3aad: Waxa aan fududeyneynaa:

1. $(6x^5 + 18x^4 - 3x^2) \div 3x^2$
2. $(20x^3y + 12x^2y^2 - 10xy) \div 2xy$

Furfuris

$$\begin{aligned} 1. \quad (6x^5 + 18x^4 - 3x^2) \div 3x^2 \\ = \frac{6x^5}{3x^2} + \frac{18x^4}{3x^2} - \frac{3x^2}{3x^2} = 2x^3 + 6x^2 - 1 \end{aligned}$$

$$\begin{aligned} 2. \quad (20x^3y + 12x^2y^2 - 10xy) \div 2xy \\ = \frac{20x^3y}{2xy} + \frac{12x^2y^2}{2xy} - \frac{10xy}{2xy} = 10x^2 + 6xy - 5 \end{aligned}$$

1. Raadi Taranta:

- i. $(5x + 7)(3x + 4)$
- ii. $(4x + 9)(x - 6)$
- iii. $(2x + 5)(4x - 3)$
- iv. $(3y - 8)(5y - 1)$
- v. $(7x + 2y)(x + 4y)$
- vi. $(9x + 5y)(4x + 3y)$
- vii. $(3m - 4n)(2m - 3n)$
- viii. $(x^2 - a^2)(x - u)$
- ix. $(x^2 - y^2)(x + 2y)$
- x. $(3p^2 + q^2)(2p^2 - 3q^2)$
- xi. $(2x^2 - 5y^2)(x^2 + 3y^2)$
- xii. $(x^3 - y^3)(x^2 + y^2)$
- xiii. $(x^4 + y^4)(x^2 - y^2)$

2. Raadi taranta tibxaalayaasha hoose:

- i. $(x^2 - 3x + 7)(2x + 3)$
- ii. $(3x^2 + 5x - 9)(3x - 5)$
- iii. $(x^2 - xy + y^2)(x + y)$
- iv. $(x^2 + xy + y^2)(x - y)$
- v. $(x^3 - 2x^2 + 5)(4x - 1)$
- vi. $(9x^2 - x + 15)(x^2 - 3)$
- vii. $(x^2 - 5x + 8)(x + 2)$
- viii. $(x^3 - 5x^2 + 3x + 1)(x^2 - 3)$
- ix. $(3x + 2y - 4)(x - y + 2)$
- x. $(x^2 - 5x + 8)(x + 2x - 3)$
- xi. $(2x^2 + 3x - 7)(3x^2 - 5x + 4)$
- xii. $(9x^2 - x + 15)(x^2 - x - 1)$

3. Isu qeybi

- i. $24x^2y^3 \div 3xy$
- ii. $36xym^2 \div -9xy$
- iii. $-72x^2y^2m \div -12xym$
- iv. $-56mnq^2 \div 7mnq$

4. U qeybi

- i. $(5m^3 - 30m^2 + 45m) \div 5m$
- ii. $(8x^2y^2 - 6xy^2 + 10x^2y^3) \div 2xy$
- iii. $(9x^2y - 6xy + 12xy^2) \div -3xy$
- iv. $(12x^4 + 8x^3 - 6x^2) \div -2x^2$

3.4 Isla'egyada Toosan ee fudud

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Qeexaan isla'egta fudud.
2. Ku muujiyaan garaaf
3. Furfuraan mas'alooyinka isla'egta fudud.

3.4 .1 Isla'egyada Toosan Ee Fudud

Isla'eg waa oraah aljebraad oo sheegaysa in ay isla'egyihiin laba weedh. Habbada, isla'egtu haddii ay sidato keliya hal doorsoome oo jibbaarkiisu yahay hal waxaa loo yaqaanaa isla'eg fudud oo toosan. Tusaale ahaan isla'egta $3x + 7 = 10$.

Sidoo kale, isla'egta toosan waxa ay sidan kartaa hal doorsoome iyo ka badan. Isla'egtu waxa ay samaysantaa marka dhowr oraah la isku geeyo islamarkaana loo qoro oraah xisaab ahaan.

Tusaalaha 1aad: Tiro ayaa loo geeyay 5 si loo helo 25. Waxaa loo qori karaa $x + 5 = 25$

Haddaba isla'egta noocan oo kale ah waxaa loo yaqaanaa isla'eg fudud ee toosan.

Haseyeeshee, oraah xisaabeedka ah (wadarta laba tiro waa 45) marka aan dooneyno in aan qorno waxa aan u qori karnaa $x + y = 45$. Haddaba, isla'egta noocan oo kale ah waxaa loo yaqaan isla'eg toosan oo leh laba doorsoome.

Waxqabadka 1aad

Waxa aan u kala soocaynaa isla'eg toosan iyo isla'eg aan toosneyn:

1. $2 + x = 19$
2. $7x^2 - 5 = 3$
3. $4r^3 = 12$
4. $6m + 2$
5. $n = 10$
6. $\frac{6x}{8} + y = 1$

Waxqabadka 2aad

Waxa aan sheegaynaa haddii isla'egyada soo socdaa ay toosanyihiin

1. $t(t - 5) = 10$
2. $x^2 = 2x$

Furfurista Isla'egta Toosan

Markaa aan furfureyno isla'egta toosan waxa aan doorsoomaha ku jira isla'egta ku badalaynaa tiro ama waxa aan furfureynaa isla'egta si loo helo qiimaha tirada uu matalyo doorsoomaha.

Tusaalaha 1aad: Waxa aan furfureynaa isla'egta toosan ee $x - 7 = 6$

Furfuris

$$x - 7 = 6$$

$$x - 7 + 7 = 6 + 7 \quad (7 \text{ u gee dhinac kasta})$$

$$x = 13$$

Tusaalaha 2aad: Waxa aan furfureynaa isla'egta toosan ee $3x = 51$

Furfuris

$$3x = 51$$

$$\frac{3x}{3} = \frac{51}{3} \text{ (u qeybi 3 dhan walba)}$$

$$x = 17$$

Tusaalaha 3aad: Waxa aan furfureynaa isla'egta ah $2x + 5 = 9$

Furfuris

$$2x + 5 = 9$$

$$2x + 5 - 5 = 9 - 5 \text{ (ka goo 5 dhan walba)}$$

$$2x = 4$$

$$\frac{2x}{2} = \frac{4}{2} \text{ (u qeybi 2 dhan walba)}$$

$$x = 2$$

Tusaalaha 4aad: Waxa aan furfureynaa isla'egta toosan ee $\frac{4y}{3} - 7 = \frac{2y}{5}$

Furfuris

$$\frac{4y}{3} - 7 = \frac{2y}{5}$$

$$\frac{4y}{3} - \frac{2y}{5} = 7 \text{ (isku habee)}$$

$$\frac{20y - 6y}{15} = 7 \text{ (midee hooseeyaasha)}$$

$$\frac{14y}{15} = 7$$

$$15 \times \frac{14y}{15} = 7 \times 15 \text{ (dhanwalba ku dhufo 15)}$$

$$14y = 7 \times 15$$

$$\frac{14y}{14} = \frac{7 \times 15}{14} \text{ (dhanwalba u qeybi 14)}$$

$$y = \frac{15}{2}$$

Hubin:

Waxa aan tirada soo baxday ku bedalaynaa y si aan u hubinno:

$$\frac{4y}{3} - 7 = \frac{2y}{5}$$

$$\frac{4\left(\frac{15}{2}\right)}{3} - 7 = \frac{2\left(\frac{15}{2}\right)}{5}$$

$$\frac{30}{3} - 7 = \frac{15}{5}$$

$$10 - 7 = 3$$

$$3 = 3$$

Waxqabadka 3aad

Bare ayaa x arday ah siiyay arday kasta 3 buug, tirada buugaagta waa 24.

Waxa aan sheegeynaa tirada ardayda ee buugaagta la siiyay.

Furufur mas'alo xisaabeedyada soo socda:

1. Xarig ayaa loo jaray laba qeybood, hal qeyb waxa 3 m ka dheer yahay qeybta, tirade guud waa 17 m, raadi labada qeybood?
2. Axmad waxa 5 sano ka weynyahay Cali, haddii Axmad uu jira 17 sano, waxa aad raadisaa da,da Cali.

Fududee oo furfur isla'egyadaan:

- i. $x + 5 = 12$
- ii. $y - 9 = (-5) + 7$
- iii. $8m = 56$
- iv. $\frac{2t}{3} = 10$
- v. $20 = 6x - 4$
- vi. $2x - 5 = 3 - x$
- vii. $\frac{4}{11} - x = \frac{-7}{11}$
- viii. $\frac{2x}{3} - 4 = \frac{10}{3}$
- ix. $y + \frac{1}{6} - 3y = \frac{2}{3}$
- x. $(7x - 5) - 4(2 + 5x) = 10(2 - x)$
- xi. $-3(4x + 9) = 21$

3.4 .2 Mas'alooyinka Isla'egyada Fudud ee Toosan

Arinta ugu muhiimsan in la fahmo marka la furfurayo mas'alooyinka isla'egyada toosan waa tarjumaadda oraah xisaabeedka iyo dhisiddeeda.

Tusaalaha 1aad: Haddii wadarta laba tiro ay tahay 36, islamarkaana midkood uu dheeryahay midka kale 8, haddaba waxa aan raadineynaa tiradaas.

Furfuris

U qaado tirada yar x . Markaa tirada wayn waxa ay noqoneysaa $x + 8$.

Waxa an ognahay wadartoodu in ay tahay 36.

Haddaba,

$$x + (x + 8) = 36$$

$$2x + 8 = 36 \text{ (isugee labada } x)$$

$$2x + 8 - 8 = 36 - 8 \text{ (ka goo 8 dhanwalba)}$$

$$2x = 28 \text{ (u qeybi 2 dhanwalba)}$$

$$x = 14$$

Haddaba, tirada haddii ay tahay $x = 14$

tan wayn waxa ay tahay $x + 8 = 14 + 8 = 22$

Tusaalaha 2aad: Bas ayaa waxaa saaran 56 rakaab, qaar ka mid ah rakaabka ayaa waxa ay kusoo raaceen 8kun shilin, inta kalene waxa ay kusoo raaceen 10 kun shilin. Haddaba, haddii lacagaha laga uruuriyay rakaabka wadarteedu ay tahay 500 kun oo shilin, waxa aan raadineynaa inta rakaab ee ku saaran gaariga 8kun iyo inta ku saaran 10 kun.

Furfuris

U qaado tirada rakaabka ku saaran baska 8 kun y

Inta ku saaran 10 kun u qaado $(56 - y)$

Wadarta lacagaha = 500

Haddaba, $8 \times y + 10 \times (56 - y) = 500$

$$8y - 10y + 560 = 500$$

$$-2y = -60$$

$$y = 30$$

Haddaba, 30 rakaab ayaa ku saaran baska 8 kun

Halka 26 ka kalane ay ku saaran yihiin 10 kun

Tusaalaha 3aad: Dhererka mooro leh qaab laydi ah ayaa ka dheer ballaceeda 9 mitir. Haddaba, waxa aan raadineynaa dhererka iyo ballaca moorada haddii wareegeedu yahay 154m.

Furfuris

U qaado ballaca moorada x

Markaa dhererku waxa uu noqonayaa $x + 9$

$$\text{Wareegga moorada} = 2(\text{dherer} + \text{ballac})$$

$$W = 2(x + 9 + x) = 4x + 18$$

Haddaba, $4x + 18 = 154$

$$4x + 18 - 18 = 154 - 18$$

$$4x = 136$$

$$x = 34$$

Haddaba ballacu waa 34m halka dhererku noqonayo $34 + 9 = 43m$.

Tusaalaha 4aad: Hooyo ayaa da'deedu waxa ay ku shan laabantaa da'da gabadheeda. Laba sano kadib, da'da hooyadu waxa ay ku afar laabmi doontaa da'da gabadheeda. Haddaba waxa aan sheegeynaa da'da hooyada iyo da'da gabadheeda iminka.

Furfuris

Qofka	Da'da Hadda	Da'da Laba sano ka dib
Hooyada	$5x$	$5x + 2$
Gabadha	x	$x + 2$

Waxaa ognahay

Labo sano Kadin, da'da hooyadu=4 laabka da'da gabadha

$$5x + 2 = 4(x + 2)$$

$$5x + 2 = 4x + 8$$

$$5x - 4x = 8 - 2$$

$$x = 6$$

Hadaba da'da gabadha waa 6 jir

Da'da hooyadana waa $5 \times 6 = 30$ sano jir

Layli

1. Tiro ayaa ku 7 laabanta tiro kale. Haddaba, raadi tiradaas haddii faraqa labada tiro yahay 18.
2. Wadarta 3 tiro oo isxigta ayaa ah 75. Haddaba, raadi tirooyinkaas tirada ugu wayn.
3. Dhererka laydi ayaa ah $\frac{1}{3}$ laabka ballaciisa. Haddaba, raadi dhererka iyo ballaca laydiga haddii wareegga laydigu yahay 64m.
4. Tiro ka kooban labo god ayaa wadarta godadkeedu yihiin 9. Haddii tiradaas laga gooyo 27 godadkiisu waa ay weydaaranayaan. Haddaba, raadi tiradaas.
5. Tareen xawaarihiisu yahay $60km/saac$ ayaa muddo 15 daqiiqo ka dib ku gaaraya bar tilmaameedkiisa. Balse, haddii uu ku xawaareeyo $85km/saac$ keliya waxa uu dib dhacayaa 4 daqiiqo. Haddaba, waa maxay fogaanta ay tahay in uu jaro.

3.4 .3 Midaalada Aljabra

Midaal waa isla'eg kasta oo ku habboon qiima kasta oo lagu badalo doorsoomayaasheeda. Midaaladda waa ay badanyihiin haseyeeshee waxa aan ku baran doonnaa heerkaan afarta ugu adeegsiga badan:

1. $(a + b)^2 \equiv a^2 + 2ab + b^2$
2. $(a - b)^2 \equiv a^2 - 2ab + b^2$
3. $(a^2 - b^2) \equiv (a - b)(a + b)$
4. $(x + a)(x + b) \equiv x^2 + (a + b)x + ab$
5. $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

×	a^2	$2ab$	b^2
a	a^3	$2a^2b$	ab^2
b	a^2b	$2ab^2$	b^3

$= a^3 + 3a^2b + 3ab^2 + b^3$

6. $(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

×	a^2	$-2ab$	b^2
a	a^3	$-2a^2b$	ab^2
$-b$	$-a^2b$	$2ab^2$	$-b^3$

$= a^3 - 3a^2b + 3ab^2 - b^3$

7. $(x + a)(x + b)(x + c)$
 $= x^3 + (a + b + c)x^2 + (ab + bc + ac)x + abc$

Tusaalaha 1aad: Waxa aan fidineynaa midaallada soo socda:

1. $(q + 2)^2$
2. $(6^2 - x^2)$

Furfuris

1. $(q + 2)^2 = q^2 + 4q + 4$
2. $(6^2 - x^2) = (6 + x)(6 - x)$

Tusaalaha 2aad: Waxa aan fidineynaa midaallada soo socda:

1. $(3 - a)^2$
2. $(a + b)^2 - (a - b)^2$

Furfuris

1. $(3 - a)^2 = 3^2 - 6a + a^2 = 9 - 6a + a^2$
2. $(a + b)^2 - (a - b)^2$
$$= (a^2 + 2ab + b^2) - (a^2 - 2ab + b^2)$$
$$= a^2 + 2ab + b^2 - a^2 + 2ab - b^2 = 4ab$$

Tusaalaha 3aad: Waxa aan fidineynaa midaallada soo socda:

1. $m^2 - 6m + 9$
2. $k^2 - 49$
3. $(m - 10)(m + 5)$

Furfuris

1. $m^2 - 6m + 9 = (m - 3)^2$
2. $k^2 - 49 = (k - 7)(k + 7)$
3. $(m - 10)(m + 5)$
$$= m(m + 5) - 10(m + 5)$$
$$= m^2 + 5m - 10m - 50$$
$$= m^2 - 5m - 50$$

Tusaalaha 4aad: Waxa aan u tibaaxeynaa 998^2 midaalka ku habboon.

Furfuris

Midaalka ku habboon waa $(a - b)^2$

Haddaba

$$998^2 = (100 - 2)^2 = 10000 - 400 + 4 = 9604$$

Tusaalaha 5aad: Waxa aan fidineynaa $(x + 4)^3$

Furfuris

$$(x + 4)^3 = x^3 + 12x^2 + 48x + 64$$

Tusaalaha 6aad: Waxa aan u fidineynaa 103^3 midaalka ugu dhaw

Furfuris

$$\begin{aligned} 103^3 &= (100 + 3)^3 \\ &= 100^3 + 3(100)^2(3) + 3(100)(3)^2 + 3^3 \\ &= 1000000 + 90000 + 2700 + 27 \\ &= 1092727 \end{aligned}$$

Waxqabadka 4aad

Laba dugsi oo daris ah oo ku yaalla miyiga Soomaaliya — **Dugsiga B** iyo **Dugsiga T**— ayaa waxaa buugaag waxbarasho siiyay hay'ad samafal.

- Dugsiga B wuxuu helay **buugaag xisaabeed iyo saynis, wadar ahaan 150 buug.**
- Dugsiga T wuxuu helay **120 buug guud ahaan**, kuwaasoo isugu jira xisaab iyo saynis.
- Hay 'addu waxay buugaagta ku bixisay shardi ah in labada dugsi ay helaan **tiro isku mid ah oo buugaag xisaabeed ah.**
- Si kastaba ha ahaatee, Dugsiga B wuxuu helay **10 buug oo saynis ah oo ka badan** Dugsiga T.

☞ Haddaba, waxa aan shegeynaa imisa **buugaag xisaabeed** iyo imisa buugaag saynis ah ayuu mid walba helay.

Layli

1. Fidi midaallada hoose:

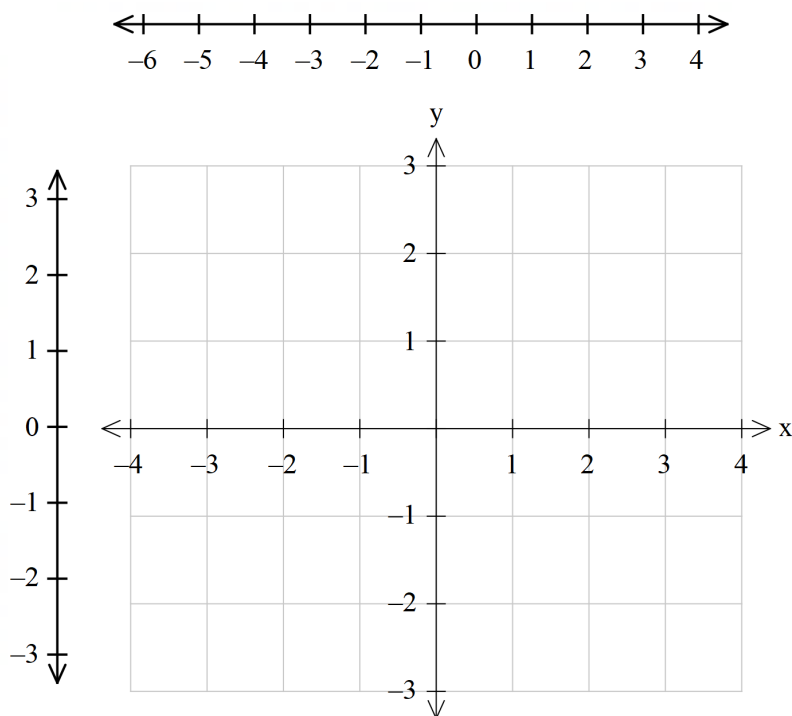
- i. $(3a + 4c)^2$
- ii. $y^2 - 16$
- iii. $(3x + 5y)(3x - 5y)$
- iv. $(5x + 3)(5x + 4)$
- v. $(3r + 2q)^2$
- vi. 105^2
- vii. 98^2
- viii. $(y - 5)(y + 5)$
- ix. $(2m + n)(2m + p)$

2. Fududee

- i. $(y - 5)^3$
- ii. 98^3
- iii. $(x + 3)(x + 5)(x + 2)$
- iv. $(x + 5)^3$
- v. $(x + 1)(x + 4)(x + 6)$
- vi. 48^3

Garaaf

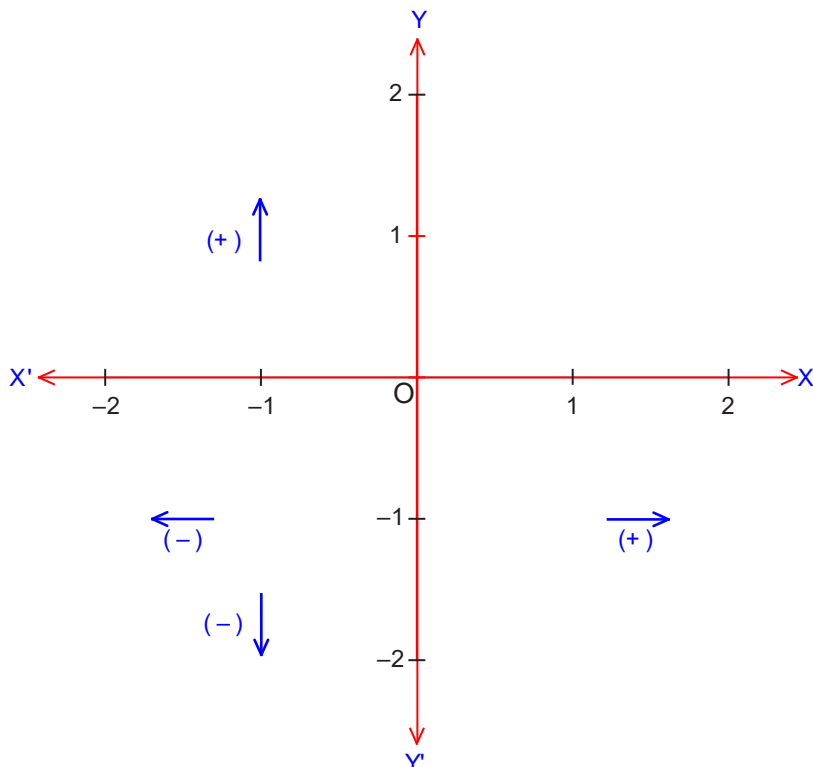
Garaaf waa habka muuqaal ahaan inoo tusaya xiriirka ka dhaxeeya tirooyinka. Waxa aan adeegsanaynaa xarriiqa tirooyinka iyo sida loo muujiyo garaafka



Habka Kaartiis

Xisaabyahan loo yaqaano Rene Decartes ayaa loogu magacdaray habkaan kadib markii uu shaaca ka qaaday sida bar loogu muujiyo habkaan. Habkaan waxa uu leeyay laba xarriiq oo midi jiftahay midina joogtahay. Labada dhidib oo ay ka koobantahay waxaa loo kala yaqaanaa dhidibka x iyo dhidibka y . Labada dhidib waxaa loo yaqaan dhidibyada kullannada. Meesha ay kullanadu dhacaan waxaa loo yaqaanaa sallaxa kaartiis.

Summadda kullannada x ee bar waa ay togantahay haddii ay dhacdo midigta dhidibka x . Sidoo kale, sumadda kullannada x waa ay tabantahay haddii ay dhacdo bidixda x .

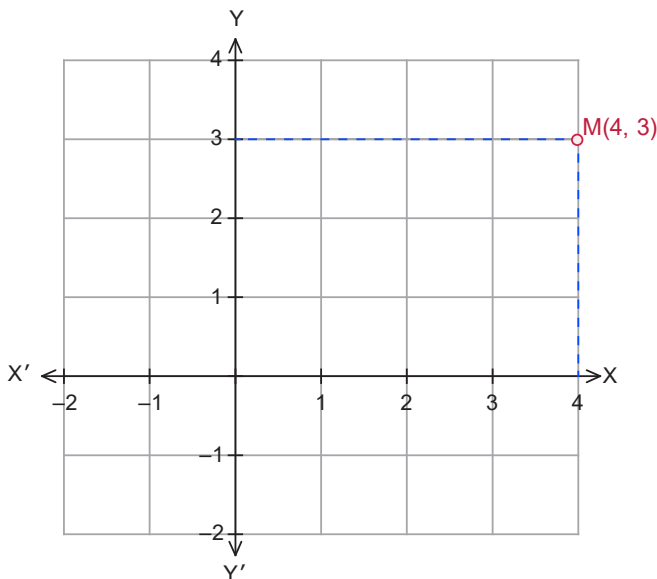


Lammaane Horsan

Bar waxa ay tahay meel ku taalla sallaxa. Bar waxaa lagu suntaa lammaane ku oodan bilo (b, t) waana laba tiro oo kala ah b iyo t tirada hore waxa ay dhacdaa dhidabka x , tirada danbana t waxa ay dhacdaa dhusha dhidabka t . Haddaba, (b, t) waxaa loo yaqaanaa lammaane horsan.

Tusaale ahaan, barta $M(4, 3)$ si aan ugu muujinno sallaxa kaartiis waxa aynu raacaynaa tallaabooyinka soo socda:

1. Markasta waxa aan ka bilaabaynaa barta xuddunta O
2. Hadba waxa aan u dhaqaaqaynaa jihada ay tilmaamayso tirada hore ee lammaanaha horsan.
3. Tusaale ahaan 4 tallaabo ayaa u qaadaynaa dhanka midig ee dhidibka x. Sidoo kale 3 tallaabo ayaa u dhaqaaqaynaa dhanka sare ee dhidibka y.
4. Kadibna barta ayaa ku summadayneynaa ay ku kulmaan.

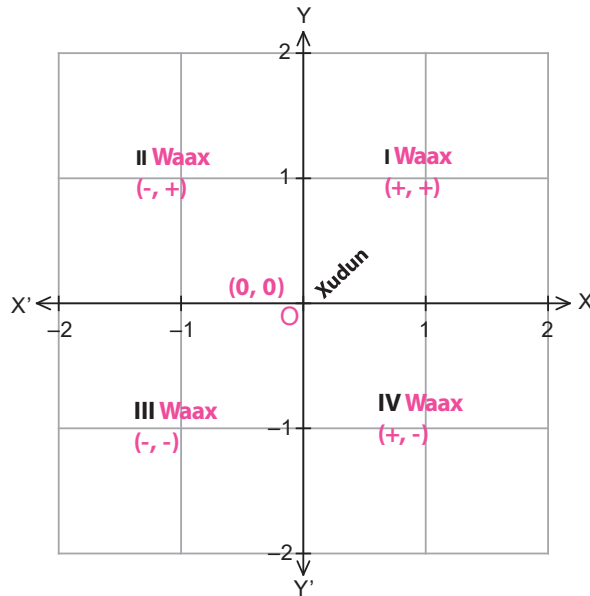


Tirada 4 waxaa loo yaqaan kullanka x halka tirada 3na loo yaqaan kullanka y .

Waxqabadka 5aad

Waxa aan barta (3,4) ku muujinaynaa sallaxa kaartiis.

Waaxaha Sallaxa Kaartiis

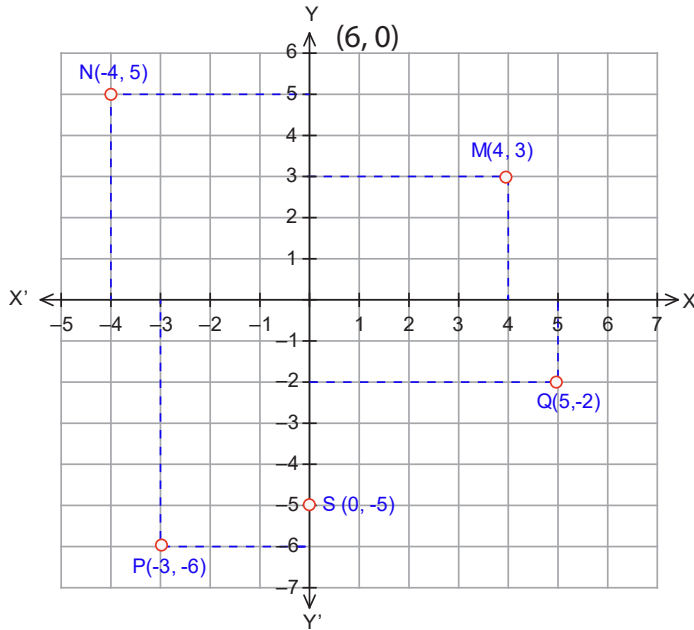


Dhidibada kullnadu waxa ay sallaxa kaartiis u qeybiyaan afar waaxood.

1. Bar kasta oo dhacda waaxda 1aad kullnadeedu waa ay toganyihiin $(+, +)$ waaxda kowad wa xagge?
2. Bar kasta oo dhacda waaxda 2aad kullanada x waa ay taban yihiin halka kullanada y na ay togan yihiin $(-, +)$.
3. Bar kasta oo dhacda waaxda 3aad kullnadeedu waa ay tabanyihiin $(-, -)$
4. Bar kasta oo dhacda waaxda 4aad kullanada x waa ay togan yihiin halka kullanada y ay toban yihiin $(+, -)$.

Tusaalaha 1aad: Waxa aan ku muujineynaa baraha soo socda Sallaxa x-y:
 $(4,3)$, $(-4,5)$, $(-3,-6)$, $(5,-2)$, $(6,0)$, $(0,-5)$ sallaxa kaartiis.

Furfuris



Waxqabadka 6aad

Waxa aan buuxinaynaa meelaha bannaan:

Tirsi	Barta	Summadda x	Summadda y	Waaxda
1	$(-7,2)$	Taban	togan	2aad
2	$(10,-2)$			
3	$(-3,-7)$			
4	$(3,1)$			
5	$(7,0)$			
6	$(0,-4)$			

3.4 .4 Garaafka Fansaarrada Labada Doorsoome leh

Horay waxa aan kusoo barannay joometeriga xarriiqo barbarro ah, xarriiqo isjara iwm. Haddaba, sawiridda garaafyada ayaa waxa ay naga caawinayaan in aan xarriiqaha sawirno.

Isla'egta toosan waa isla'eg ka kooban laba doorsoome sida x iyo y kuwaasoo muujiya xarriiq toosan.

Haddaba, si aan u sawirno isla'egta toosan waa in aan ugu yaraan heysanna laba barood.

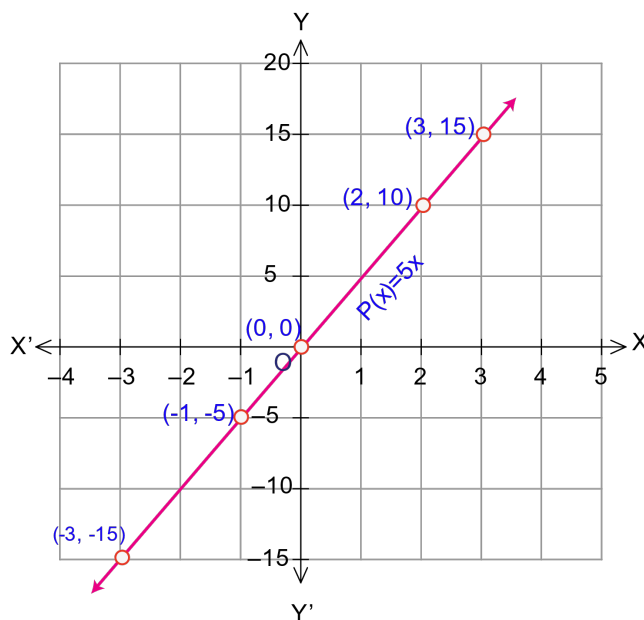
Tusaalaha 1aad: Waxa aan sawireynaa garaafka $y = 5x$

Furfuris

x	-3	-1	0	2	3
y	-15	-5	0	10	15

x	$Y = 5x$
-3	$Y = 5x(-3) = -15$
-1	$Y = 5x(-1) = -5$
0	$Y = 5x(0) = -15$
2	$Y = 5x(2) = -15$
3	$Y = 5x(3) = -15$

Waxa aan baraha shaxda kore ku muujineynaa garaafka



Tusaalaha 2aad: Waxa aan sawireynaa garaafka $y = x + 1$

Furfuris

x	-2	-1	0	1	2
y	-1	0	1	2	3

x	$Y = x + 1$
-2	$Y = -2 + 1 = -1$
-1	$Y = -1 + 1 = 0$
0	$Y = 0 + 1 = 1$
1	$Y = 1 + 1 = 2$
2	$Y = 2 + 1 = 3$

Waxa aan baraha sare ku muujineynaa sallaxa kaartiis

Waxqabadka 7aad

Waxa aan sheegaynaa xiriirka ka dhaxeeya laba garaaf.

Waxqabadka 8aad

Waxa aan buuxinaynaa meelaha bannaan

B) $x = y + 3$

T) $2x + y - 6 = 0$

J) $y = 3x + 1$

x	0		-2	
y		0		-3

x	0		-1	
y		0		-2

x	-1	0	1	2
y				

Tusaalaha 3aad: Waxa aan Ku muujineynaa garaaf isla'egta $2x + y = 4$

Furfuris

Marka hore waxa aan u qoreynaa isla'egta sidatan $y = 4 - 2x$

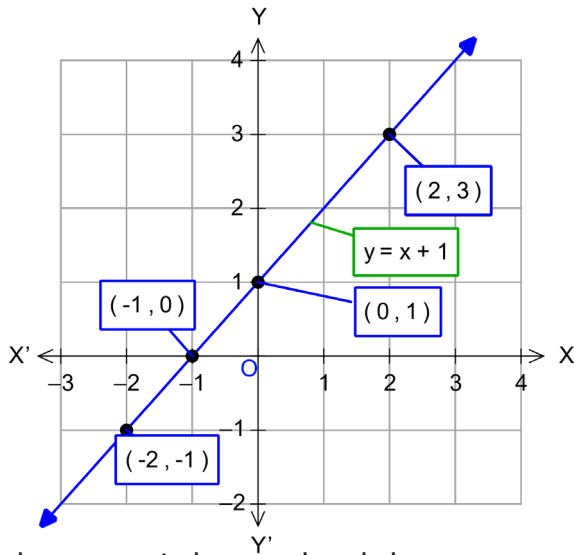
Marka $x = -4, y = 4 - 2(-4) = 4 + 8 = 12$

Marka $x = -2, y = 4 - 2(-2) = 4 + 4 = 8$

Marka $x = 0, y = 4 - 2(0) = 4 + 0 = 4$

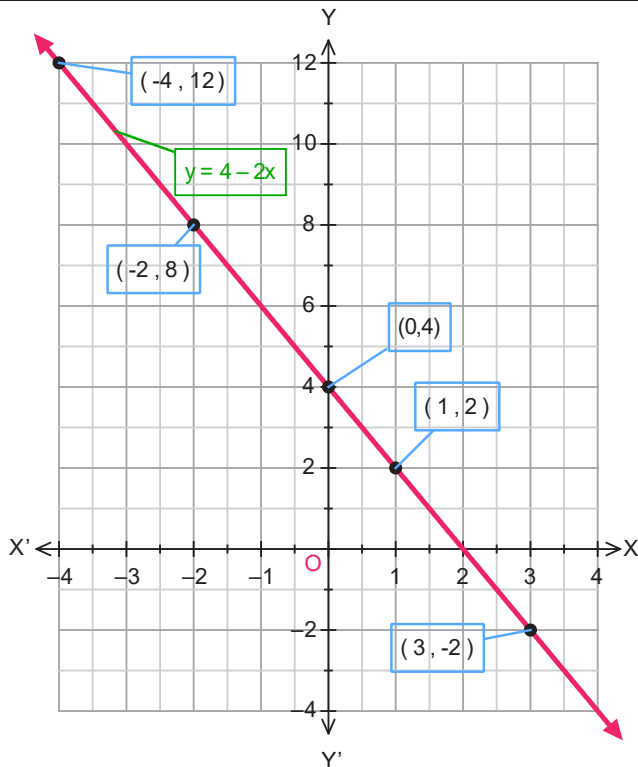
Marka $x = +1, y = 4 - 2(+1) = 4 - 2 = 2$

Marka $x = +3, y = 4 - 2(+3) = 4 - 6 = -2$



Waxa aan kusoo ururin karnaa shaxda hoose.

x	-4	-2	0	1	3
y	12	8	4	2	-2



3.4 .5 Isla'egyada Wadajira

Isla'egyada wada jira waxa ay ka koobanyihiin laba isla'eg toosan ama ka badan islamarkaana leh doorsoomayaal isku mid ah.

Haddaba, habka isla'egyada wada jira waxaa lagu muujin karaa garaafka kaartiis innaga oo u marayna si lamid ah sidii sawiridda isla'egyadii toosnaa. Marka aynu dooneyno in aan furfurno isla'egyo wada jira waxa aynu u maraynaa habab kala duwan sida in aan adeegsanno garaaf ama hababka aljebraad sida ku badalashada, islabixinta iyo iswaydaarka. Haddaba, casharkaan waxa aan ku barandoonnaa hababkaas kala duwan.

Habka Garaaafka

Tusaalaha 1aad: Waxa aan adeegsaneynaa habka garaafka si aan u furfurno isla'egyadaan wada jira:

$$x + y = 5$$

$$2x - y = 4$$

Furfuris

Marka hore waxa aan qaadanaynaa dhowr barood sida ka muuqata tusaha hoose:

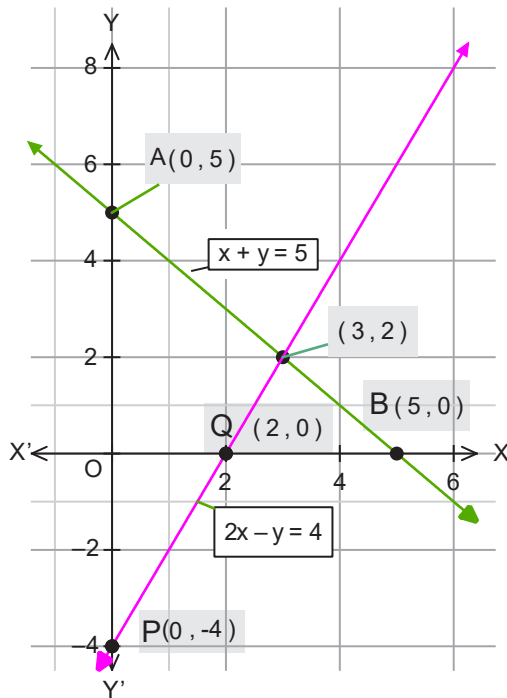
$$x + y = 5$$

x	0	5	3
y	5	0	2

$$2x - y = 4$$

x	0	2	3
y	-4	0	2

Haddaba, waxa ay wadaagaan labada isla'eg barta (3,2) garaafka hoosena waa uu ina tusayaa



Tusaalaha 2aad: Waxa aan adeegsaneynaa habka garaaf si aan u furfurno isla'egyada wada jira ee hoose:

$$3x + 2y = 6$$

$$6x + 4y = 8$$

Furfuris

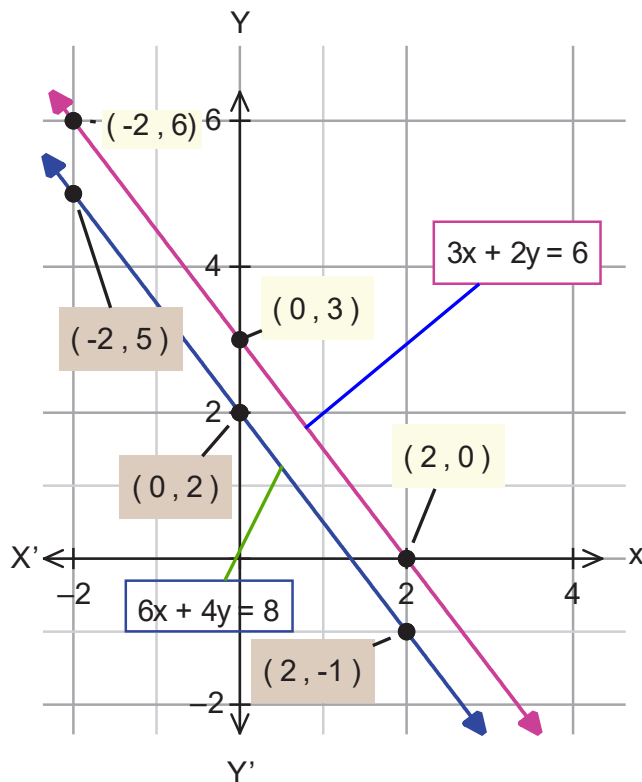
Marka hore waxa aan helaynaa baraha

$$3x + 2y = 6$$

X	-2	0	2
y	6	3	0

$$6x + 4y = 8$$

X	-2	0	2
y	5	2	-1



Habka ku Badalashada

Habkaan marka aynu joogno habka ku badalashada waxa aan qiimo ku badalaynaa mid ka mid ah doorsoomayaasha isla'egyada kadibna waxa aynu u xallinaynaa isla'egta doorsoomaha kale.

Tusaalaha 1aad: Waxa aan furfureynaa isla'egyadaan wadajira adiga oo adeegsanaya habka

$$x + 3y = 16$$

$$2x - y = 4$$

Furfuris

$$x + 3y = 16 \dots \dots \dots (1)$$

$$2x - y = 4 \dots \dots \dots (2)$$

Tallaabada 1aad	Tallaabada 2aad	Tallaabada 3aad	Furfurista
Isla'egta 2aad	Isla'egta (3) ku badal (1)	$x = 4$ ku badal (3)	$x = 4$
$2x - y = 4$	$x + 3y = 16$	$y = 2x - 4$	lyo $y = 4$
$-y = 4 - 2x$	$x + 3(2x - 4) = 16$	$y = 2(4) - 4$	
y	$x + 6x - 12 = 16$	$y = 8 - 4$	
$= 2x - 4 \dots \dots (3)$	$7x = 28$	$y = 4$	
	$x = 4$		

Habka Islabixinta

Habkaan waa habkale oo lagu furfuri karo isla'egyada wadajira, waxa uuna ka fudud yahay habka isku bedelidda ee aan horay usoo aragnay. Waxa aan bixineynaa hal doorsoome si aan u helno isla'egta toosan oo hal doorsoome leh si ay inoogu sahlanaato markaa furfuristeeda.

Waxaana u raacaynaa tallaabooyinka hoose:

1. Ku dhufo labada isla eg tiro ku habboon tiyoo isla'ekeyneysa labada wehliye ee isla'egta.
2. Kala goo labada isla'eg tiyoo keeneysa in hal doorsoome ka baxo Meesha.
3. Isla'egta hartay furfur.
4. Qiimaha kuusoo baxo ku bedel labada isla'eg middood si aad u hesho qiimaha doorsoomaha haray.

Tusaalaha 2aad: Waxa aan furfureynaa isla'egyadaan wadajira:

$$4a + 3b = 65 \text{ iyo } a + 2b = 35$$

Furfuris

$$4a + 3b = 65 \dots (1)$$

$$a + 2b = 35 \dots (2)$$

Waxa aan -4 ku dhufanaynaa isla'egta 2aad.

$$4a + 3b = 65$$

$$\underline{-4a - 8b = -140}$$

$$-5b = -75$$

$$b = 15$$

Waxa aan 15 ku badalaynaa isla'egta 2aad

$$a + 2b = 35$$

$$a + 2(15) = 35$$

$$a + 30 = 35$$

$$a = 35 - 30$$

$$a = 5$$

Haddaba, $a = 5, b = 15$

Waxqabadka 9aad

Cabdi wuxuu iibsaday 1 kiilo kalluun iyo 2 kiilo bariis, wuxuuna bixiyay \$5.

Aamina waxay iibsatay 2 kiilo kalluun iyo 1 kiilo bariis, waxayna bixisay \$6.

Haddaba, waxa aan sheegeynaa qiimaha 1 kiilo kalluun iyo qiimaha 1 kiilo bariis.

Bare- arday waxa ogaata qaab dhismeedka mas'alo xisaabeedka

x = qiimaha 1 kiilo kalluun

y = qiimaha 1 kiilo bariis

Markaas waxaan helaynaa laba islaeg:

$$x + 2y = 5 \text{ (Cabdi)}$$

$$2x + y = 6 \text{ (Aamina)}$$

Tusaalaha 1aad:

Nin reer guuraa ah wuxuu hayaa geel iyo ri'.

Wadar ahaan wuxuu hayaa 15 xoolo.

Dhammaan xoolahaasi waxsa ay leeyihiin 50 lugood.

Haddaba, waxa aan sheegeynaa imisa geel iyo immisa ri' ayuu hayaa.

Fufuris

Geelu wuxuu leeyahay 4 lugood

Riyaha waxay leeyihiin 4 lugood (Halkan waxaan u isticmaaleynaa tirada xoolaha iyo tirada lugaha)

$$X + y = 15 \text{ (ri, } x, y = \text{geel)}$$

$$4x + 4y = 50$$

Layli

1. Raadi waaxda ay dhacaan baraha soo socda:

- i. $(3, -4)$
- ii. $(5, 7)$
- iii. $(2, 0)$
- iv. $(-3, -5)$
- v. $(4, -3)$
- vi. $(0, 10)$
- vii. $(8, -4)$

2. Ku muuji sallaxa kaartiis:

- i. $B(5, 2)$
- ii. $T(-7, -3)$
- iii. $J(-2, 4)$
- iv. $X(-1, -1)$
- v. $K(0, -5)$
- vi. $D(2, 0)$
- vii. $R(7, -4)$
- viii. $S(-4, 0)$
- ix. $C(2, 3)$
- x. $G(8, -4)$
- xi. $F(0, 7)$.

3. Ku muuji garaaf isla'egyada hoose:

- i. $y = 2x$
- ii. $y = 2x + 2$
- iii. $y = 3x + 5$
- iv. $2x + 3y = 6$

v. $y = 3x - 1$

vi. $y = \left(\frac{2}{3}\right)x + 3$

4. Adeegso habka garaafka si aad u furfurto isla'egyada wada jira ee hoose:

i. $\begin{cases} y = 2x + 1 \\ -4x + 2y = 2 \end{cases}$

ii. $\begin{cases} x + y = 7 \\ x - y = 3 \end{cases}$

iii. $\begin{cases} 3x + 2y = 4 \\ 9x + 6y = 12 \end{cases}$

iv. $\begin{cases} y = 2x + 1 \\ y + 3x - 6 = 0 \end{cases}$

v. $\begin{cases} x - y = 0 \\ y + 3 = 0 \end{cases}$

5. Furfur isla'egyadaan adiga oo adeegsanaya habka ku badalashada:

i. $\begin{cases} x + y = 5 \\ x - y = 3 \end{cases}$

ii. $\begin{cases} 2x - 3y = 7 \\ 5x + y = 9 \end{cases}$

iii. $\begin{cases} 1.5x + 0.1y = 6.2 \\ 3x - 0.4y = 11.2 \end{cases}$

iv. $\begin{cases} \sqrt{2}x - \sqrt{3}x = 1 \\ \sqrt{3}x - \sqrt{8}x = 0 \end{cases}$

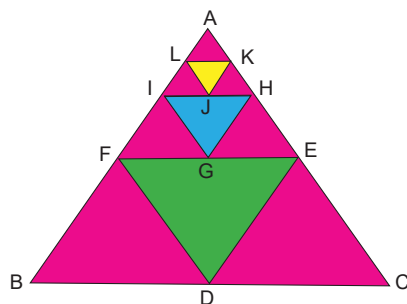
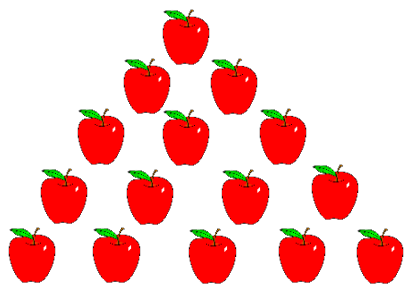
6. Furfur isla'egyadaan adiga oo adeegsanaya habka islabixinta:

i. $\begin{cases} 8x - 3y = 5xy \\ 6x - 5y = -2xy \end{cases}$

ii. $\begin{cases} 2x - y = 3 \\ 3x + y = 7 \end{cases}$

iii. $\begin{cases} x - y = 5 \\ 3x + 2y = 25 \end{cases}$

Cutubka 4aad: Sunsunno iyo Dareerinno



Horudhac

Cutubkaan waxa aan ku baran doonnaa qaar ka mid ah astaamaha tirooyinka iyo sunsunkooda iyo dareerinnadooda. Sunsun waa fansaar horraadkiisu yahay abyooneyaal.

Nolol maalmeedkeenna caadiga ah waxaa jira tusaalooyin badan oo raaca qaabab cayiman Tusaalaha ahaan:

1. Dhigashada go'an ee bangiga, qiimaha dhigashada waxa uu isku laabmayaa sanad walba qiimo go'an.
2. Haddii qofka la siiyo shaqo bille ah mushaarkeeduna yahay 18,000 islamarkaana sanadkiiba ay u kordheyso 400 markaa lacagaha waxa ay noqon doonaan sanadka koowaad 18,000, 18,400, 18,800, ...
3. Sunsun waa tiro walxo ah oo midba midka kale ku xigo

Tusmada cutubka

Cutubkaan waxa aan ku baran doonnaa casharada hoose:

1. Sunsun Aritmetig
2. Dareerin Aritmetig
3. Sunsun Joometeri
4. Dareerin Joometeri

Ujeeddooyinka cutubka

Dhammaadka cutubkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Qeexaan sunsun aritmetig iyo dareerin aritmetig.
2. Qeexaan sunsun joometeri iyo dareerin joometeri.
3. Heli karaan tibixkasta ee sunsunnada.
4. Wadareeyaan sunsunnada.

4.1 Sunsunka Aritmetigga

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

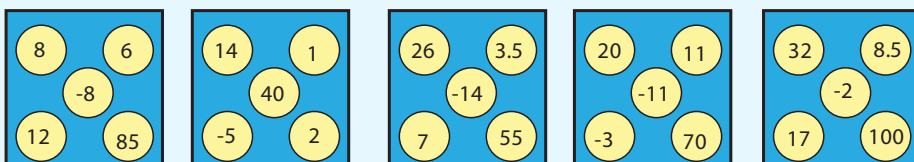
1. Qeexaan sunsun aritmetig.
2. Heli karaan tibixda guud ee sunsun aritmeetigga (S.A).

Marka aan ka hadlayno sunsunka aritmetigga waxaa jira in labadii tibix kasta oo isxiga faraqoodu isku mid yahay, waxaana loo yaqaanaa faraq wadaag.

Qeexid: Haddii labadii tibixood kasta ee isku xiga faraqoodu yahay isku mid markaa waa sunsun aritmetig (S.A).

Waxqabadka 1aad

Waxa aan adeegsanaynaa shaxannada hoose annaga oo shaxankasta ka qaadanayna hal, kadibna waxa aan tirooyinkaas ka samaynaynaa sunsun aritmeetig.



Waxqabadka 2aad

Waxa aan hoosta ka xarriiqaynaa midka ah sunsun aritmeetig:

1. $-5, 1, 7, 13, \dots$
2. $1, 3, 7, 10, 11, 13$

Tusaalaha 1aad: Waxa aan raadinaynaa sunsun aritmeetigga hoose faraq wadaaggooda.

1. $2, 6, 10, 14, \dots$
2. $21, 18, 15, 12, \dots$
3. $a, a + d, a + 2d, \dots$

Furfuris

1. $2, 6, 10, 14, \dots$ faraq wadaaggu waa 4
2. $21, 18, 15, 12, \dots$ faraq wadaaggu waa -3
3. $a, a + d, a + 2d, \dots$ faraq wadaaggu waa d

Tusaalaha 2aad: Waxa aan qoreynaa saddexda tibix ee ku xiga tibixda u danbeysa S.A 27, 29, 31, 33.

Furfuris

Sida an aragno faraq wadaaggu waa 2. Haddaba, saddexda tibix ee ku xiga tibixda u danbeysa waa 35, 37 iyo 39.

Tibixda Guud ee S.A.

kasoo qaad in S.A. ay tibixdiisa koowaad tahay a , faraq wadaagguna yahay d . S.A. waa sidaan $a, a + d, a + 2d, \dots$

Waxqabadka 3aad

Haddii faraaq tibxaha sunsun uu yahay eber waxa aan sheegaynaa waxa loo yaqaanno.

Waxqabadka 4aad

Waxa aan raadinaynaa jid lagu heli karo tibixda guud ee S.A.

Haddaba, tixida T_n ayaa waxaa loo yaqaanaa tibixda guud ee S.A

$$T_n = a + (n - 1)d$$

Ogow in faraaq wadaaggu lagu heli karo sidatan

$$d = T_2 - T_1 = T_3 - T_2 = \dots = T_n - T_{n-1}$$

Tusaalaha 3aad: Waza aan raadineynaa tibixda 20aad iyo tibixda n^{aad} ee S.A hoose:

- i. 3, 7, 11, 15, ...
- ii. 13, 10, 7, 4, ...

Fufuris

- i. 3, 7, 11, 15, ...

Tibixda 1aad waa $a = 3$, faraaq wadaagga waa $d = 7 - 3 = 4$

1. Tibixda 20naad waa, $T_{20} = 3 + (20 - 1)(4) = 3 + 76 = 79$
2. Tibixda n^{aad} waa, $T_n = 3 + (n - 1)4 = 3 + 4n - 4 = 4n - 1$

- ii. 13, 10, 7, 4, ...

Tibixda 1aad waa $a = 13$, faraaq wadaagga waa $d = 10 - 13 = -3$

1. Tibixda 20naad waa, $T_{20} = 13 + (20 - 1)(-3) = 13 - 57 = -44$
2. Tibixda n^{aad} waa, $T_n = 13 + (n - 1)(-3) = 13 - 3n + 3 = -3n + 16$

Tusaalaha 4aad: Waxa aan sheegeynaa inta tibix ee ku jirta S.A 7,13,19,...,307

Furfuris

Aan u qaadanno tibxaha guud in ay yihiin n tibix, markaa $T_n = 307$

Waxa aan haysanaa $a = 7, d = 6$ iyo $T_n = 307$ qiimooyinkan ayaa ku badalaynaa xeerka S.A.

$$T_n = a + (n - 1)d$$

$$307 = 7 + (n - 1)(6)$$

$$307 = 7 + 6n - 6$$

$$307 = 6n + 1$$

$$307 - 1 = 6n$$

$$n = \frac{306}{6} = 51$$

Haddaba, tirada tibxaha ee S.A. waa 51 tibxood.

Tusaalaha 5aad: Waxa an raadinaynaa dhufsaneyaasha tirada 7 ee u dhaxeeya 100 iyo 500.

Furfuris

Dhufsaneyaasha 7 ee u dhaxeeya 100 iyo 500 sunsunkoodu waa 105,112,...,497

Haddaba, $a = 105, d = 7, T_n = 497$

$$T_n = a + (n - 1)d$$

$$497 = 105 + (n - 1)(7)$$

$$497 = 105 + 7n - 7$$

$$497 = 7n + 98$$

$$497 - 98 = 7n$$

$$n = \frac{399}{7} = 57$$

Haddaba, tirada dhufsaneyaasha 7 ee u dhaxeeya 100 iyo 500 waa 57 dhufsane

Tusaalaha 6aad: Tibixda lixaad ee S . A haddii ay tahay 22, tibixda 10^{aad}na ay tahay 38, waxa aan raadineynaa:

1. Tibixda 1^{aad} iyo Faraq wadaagga
2. Tibixda 100^{aad}

Furfuris

1. Haddii a ay tahay tibixda koowaad, d ay tahay faraq wadaagga

$$T_6 = 22$$

$$\text{Haddaba, } a + 5d = 22 \quad (1)$$

$$T_{10} = 38$$

$$\text{Haddaba, } a + 9d = 38 \quad (2)$$

Haddii aan furfurno isla'egyada wada jira ee 1 iyo 2 waxa ay nu helaynaa:

$$d = 4$$

Markaa waxa aynu qiimaha d ku badalaynaa isla'egta 1aad

$$a + 5d = 22$$

$$a + 5(4) = 22$$

$$a = 22 - 20$$

$$a = 2$$

Haddaba, tibixda 1aad waa 2 halka faraq wadaaguna yahay 4.

2. Tibixda 100aad waa

$$T_{100} = a + 99d$$

$$= 2 + 99(4)$$

$$= 398$$

Tusaalaha 7aad: Haddii tibixda n^{aad} ee S.A. ay tahay $40 + 7n$, haddaba waxa aan raadineynaa:

1. Faraq wadaagga
2. Tibixda ay tahay tirada 215

Furfuris

1. Faraq wadaagga

$$T_n = 40 + 7n$$

$$T_1 = 40 + 7(1) = 47$$

$$T_2 = 40 + 7(2) = 54$$

Haddaba, faraq wadaaggu waa $T_2 - T_1 = 54 - 47 = 7$

2. Tibixda ay tahay tirada 215

U qaado $T_n = 215$

$$40 + 7n = 215$$

$$7n = 175$$

$$n = 25$$

Haddaba, tirada 215 waa tibixda 25aad

Waxqabadka 5aad

Hooyo ayaa waxa ay dooneysaa in ay 207 shilin u qeybiso saddex qeybood oo S.A ah kadibna ay u qeybiso saddex ka mid ah ubadkeeda, haddaba hadii taranta labada qiime ee ugu yar oo ay ubadku heleen tahay 4623, waxa aan raadineynaa inta uu helay ubad kasta.

Tusaalooyin ku dabbaqan nolol maalmeedka:

1. Arday Soomaaliyeed oo ku sugan Muqdisho wuxuu bilaabayaa inuu kaydsado \$5 toddobaadka koowaad, wuxuuna toddobaad walba ku darayaa \$2
Toddobaadka 1aad: \$5
Toddobaadka 2aad: \$7
Toddobaadka 3aad: \$9
Toddobaadka 4aad: \$11

Susun artimetigadu waa: 5, 7, 9, 11, ...

2. Shirkadda X ee isgaarsiineed ayaa kordhisa qiimaha xirmooyinka internet-ka \$1 sanad walba.
Sanadka 1aad: \$10
Sanadka 2aad: \$11
Sanadka 3aad: \$12

Susun artimetikadu waa : \$10, \$11, \$12, \$13, ...

3. Fasalka dugsiga, saf kasta wuxuu leeyahay 2 arday oo ka badan safka ka horreeya. Haddii safka koowaad uu leeyahay 5 arday:

Safka 1aad: 5 arday

Safka 2aad: 7 arday

Safka 3aad: 9 arday

Safka 4aad: 11 arday

Sunsun artimatigaka= 5, 7, 9, 11 ...

4. Qoys ku nool tuulo Soomaaliyeed wuxuu maalin kasta buuxiyaa haan biyood, iyagoo maalin walba ka helaya 10 litir oo ka badan maalintii hore.

Maalinta 1aad: 20 litir

Maalinta 2aad: 30 litir

Maalinta 3aad: 40 litir Qoys ku nool tuulo Soomaaliyeed wuxuu maalin kasta buuxiyaa haan biyood, iyagoo maalin walba ka helaya **10 litir oo ka badan maalintii hore.**

- Maalinta 1aad: 20 litir
- Maalinta 2aad: 30 litir
- Maalinta 3aad: 40 litir

Sunsun artimatikada= 20, 30, 40, ...

5. Miyiga Soomaaliyeed, heerkulka wuxuu hoos u dhacaa 3°C saacaddii kadib qorrax dhaca.

6:00 fiidnimo: 30°C

7:00 fiidnimo: 27°C

8:00 fiidnimo: 24°C

Sunsun artimatikada waa: 30°C , 27°C , 24°C , 21°C , ...

Layli

1. Raadi:
 - i. Tibixda 50aad ee S.A 1, 5, 9, 13, ..
 - ii. Tibixda 80aad ee S.A 24, 21, 18, 15, ...
 - iii. Tibixda 25aad ee S.A $k - 1, 2k + 1, 3k + 3, \dots$
 - iv. Tibixda n^{aad} ee S.A $1, 2\frac{1}{2}, 4, 5\frac{1}{2}, \dots$
2. Waa immisa tibix S.A soo socda:
 - i. 4, 7, 10, 13, ..., 94
 - ii. 20, 14, 8, 2, ..., -310
 - iii. $m, m + 3, m + 6, \dots, 4m$
 - iv. $2k + 1, 2k + 3, 2k + 5, \dots, 4k - 1$
3. Qor 3da tibix ee hore iyo tibixda 30aad ee S.A hoose:
 - i. $T_n = 6n + 8$
 - ii. $T_n = 40 - 8n$
4. Raadi tibixda 1aad iyo faraq wadaagga S.A hoose haddii:
 - i. Tibixda 2aad ay tahay 3 tan 8aad ay tahay -21
 - ii. Tibixda 3aad ay tahay 9 tan 10aad ay tahay 44
 - iii. Tibixda 4aad ay tahay 18 tan 9aad ay tahay 8
 - iv. Tibixda 8aad ay tahay 11 tan 15aad ay tahay 32
5. Immisa dhufsane ee tirada 7 aya u dhaxeeya 200 iyo 500
6. Haddii tibixda n^{aad} ee S.A ay tahay $26 - 3n$, haddaba muuji in sunsunku yahay S.A.

4.2 Dareerin Aritmetig

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Qeexaan dareerin aritmetig.
2. Wadarayn karaan tibxaha S.A.

Dareerin Aritmetig waa wadaraynta tibxaha S.A. haddaba, marka aan dooneyno in aan wadareyno ilaa n tibxood ee dareerin Aritmetig waxa aan u maraynaa tallaabooyinka hoose:

1. Waxa aan wadaraynaynaa 100ka tiro ee ugu horreeya abyooneyaasha togan.

Haddii aan u qorno habka caadiga ah waa:

$$S = 1 + 2 + 3 + \dots + 98 + 99 + 100 \dots (1)$$

Haddii u qor weydaar

$$S = 100 + 99 + 98 + \dots + 3 + 2 + 1 \dots (2)$$

(1) + (2) waa

$$2S = 101 + 101 + 101 + \dots + 101 + 101 + 101$$

$$2S = 100 \times 101$$

$$S = 50 \times 101$$

$$S = 5050$$

2. Habka kore ayaa waxaa laga soo minguuriyaa xeerka guud ee wadaraynta tibxaha S.A.

$$S_n = \frac{n}{2}(a + l)$$

$$l = a + (n - 1)d$$

$$S_n = \frac{n}{2}[2a + (n - 1)d]$$

3. Xiriirka ka dhaxeeya T_n iyo S_n waxaa lagu helaa jidkaan $T_n = S_n - S_{n-1}$

Tusaalaha 1aad: Waxa aan raadiyeynaa wadarta dareerinnada soo socda:

1. Dareerin aritmetig oo ka kooban 25 tibxood, halka tibixda 1aad ay tahay 5 tan u danbeysana tahay 41.
2. $3 + 5 + 7 + \dots$ ilaa 60 tibxood

Furfuris

1. Dareerin Aritmetig oo ka kooban 25 tibxood, halka tibixda 1aad ay tahay 5 tan u danbeysana tahay 41.

$$a = 5, \text{ tibixda u danbeysa waa } l = 41, n = 25$$

$$S_n = \frac{n}{2}(a + l)$$

$$S_{25} = \frac{25}{2}(5 + 41)$$

$$S_{25} = 575$$

2. $3 + 5 + 7 + \dots$ ilaa 60 tibxood

$$a = 3, d = 2, n = 60$$

$$S_n = \frac{n}{2}[2a + (n - 1)(2)]$$

$$S_{60} = \frac{60}{2}[2 \times 3 + (60 - 1)(2)]$$

$$S_{60} = 30[6 + (59 \times 2)]$$

$$S_{60} = 30(124)$$

$$S_{60} = 3720$$

Tusaalaha 2aad: Waxa aan raadineynaa oraah aljedreedka wadaraynta n-da tibxood ee ugu horeeya dareerinka $5 + 8 + 11 + \dots$. Kadibna raadi inta tibxood ee wadartooda dhan tahay 440.

Furfuris

$$a = 5, d = 3$$

$$S_n = \frac{n}{2}[2a + (n - 1)d]$$

$$S_n = \frac{n}{2}[2 \times 5 + (n - 1)(3)] = \frac{n}{2}(10 + 3n - 3) = \frac{n}{2}(3n + 7)$$

$$S_n = 440$$

$$\text{Markaa } \frac{n}{2}(3n + 7) = 440$$

$$3n^2 + 7n - 880 = 0$$

$$(3n + 55)(n - 16) = 0$$

$$n = -\frac{55}{3} \text{ ama } 16$$

Haddaba, qiimaha n waa 16

Tusaalaha 3aad: Waxa aan raadineynaa tirada tibxaha ugu yar ee looga baahanyahay wadaraynta dareerinta $7 + 13 + 19 + \dots$ si loo gaarsiiyo ilaa 1000.

Fufuris

$$a = 7, d = 6$$

$$S_n = \frac{n}{2}[2a + (n - 1)d]$$

$$S_n = \frac{n}{2}[14 + (n - 1)6]$$

$$S_n = \frac{n}{2}[14 + 6n - 6]$$

$$S_n = \frac{n}{2}(6n + 8) = n(3n + 4) = 3n^2 + 4n$$

$$S_n > 1000$$

$$3n^2 + 4n > 1000$$

$$3n^2 + 4n - 1000 > 0$$

$$n = 17.6 \approx 18$$

Haddaba tibxaha ugu yar ee loo baahanyahay waa 18 tibxood.

Tusaalooyin ku dabbaqan nolol maalmeedka:

1. Faaduma waxa ay kaydsataa \$10 usbuuca ugu horeeya, waxa ayna toddobaad walba ku daraysaa \$3, muddo 10 toddobaad ah.

Haddaba, Immisa ayay Faaduma wadar ahaan kaydsatay 5 toddobaad gudahood?

Furfuris

Toddabadka 1 aad= \$10

Toddabadka 2 aad= 13

Toddabaadka 3 aad= 16

Toddabadka 4 aad= 19

Toddabaadka 5 aad=22

Dareerin artimatikadu waa =10+13+16+19+22=8

2. Sidow oo dhigta dugsiga sare ee Baladweyne ayaa wuxuu helay 50 dhibcood bishii ugu horreysay. Dhibcahaasi wuxuu bil kasta ku kordhiyaa 5 dhibcood. Muddo 6 bilood ah ayuu nidaamkaas raacay. Haddaba waa immisa dhibcaha uu helay Sidow?

Furfuris

Bish 1 aad= 50 dhibcood

Bisha 2 aad=55 dhibcood

Bisha 3aad= 60 dhibcood

Bisha 4 aad= 65 dhibcood

Bisha 5 aad= 70 dhibcood

Bisha 6 aad= 75 dhibcood

Dareerin artimatikadu waa= $50+55+60+65+70+75=375$ dhibcooda

Waxqabadka 1aad

Qoys kamid ah qoysaska Soomaaliyeed wuxuu bixiyaa \$3 maalinta 1aad ee bisha, wuxuuna maalin walba ku darayaa \$1 oo dheeraad ah. Bishaasi waxay leedahay 30 maalmood. Haddaba waxa aan sheegeynaa lacagaha uu bixinayo qoyskaas bisha oo dhan.

Layli

1. Raadi wadarta n tibxoodka ugu horreeya ee dareerinnada soo socda:
 - i. $3, 8, 13, 18, \dots$
 - ii. $2\frac{1}{2}, 3\frac{1}{3}, 4\frac{1}{6}, 5, \dots$
 - iii. $13, 10, 7, 4, \dots$
 - iv. $a + d, a + 3d, a + 5d, \dots$
2. Raadi inta tibxood, kadibna wadaray S.A:
 - i. $2, 5, 8, 11, \dots, 134$
 - ii. $7, 3, -1, -5, \dots, -241$
 - iii. $n, n + 1, n + 2, \dots, 3n - 1$
 - iv. $k, k + 5, k + 10, \dots, 6k$
3. Haddii tibixda 1aad ee S.A ay tahay 16, tibixda 6aadna ay tahay 83, haddaba, raadi tibixda 3aad. Sidoo kale wadaree 40ka tibxood ee ugu horeeeya.
4. Haddii tibixda 4aad ee S.A ay tahay 6, tibixda 10aadna ay tahay 14, haddaba, raadi wadarta 17ka tibxood ee ugu horeeeya.

4.3 Sunsun Joometeri (S.J)

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Qeexaan sunsun joometeri.
2. Heli karaan tibixda guud ee S.J.
3. Raadin karaan saami wadaagga S.J

Casharkii hore waxa aan kusoo barannay sunsun iyo dareerin aritmetig. Waxa aan casharkaan ku baran doonnaa sunsun joometeri.

Qeexid: Sunsun joometeri tibix kasta haddii loo qeybiyo ta ka horreysa waxaa la helaa tiro joogto ah. Tiradaas joogtada ah waxaa la yiraahdaa saami wadaag Sunsunka caynkaas ah waxaa la yiraahdaa sunsun joometeri (S.J).

Tusaalaha 1aad: Waxa aan raadineynaa saami wadaagga S.J.

1. 1, 3, 9, 27, ...
2. 1, -2, 4, -8, ...
3. $3, 2, \frac{4}{3}, \frac{8}{9}, \dots$
4. $16, -4, 1, -\frac{1}{4}, \dots$

Furfuris

1. 1, 3, 9, 27, ... saami-wadaaggu waa 3
2. 1, -2, 4, -8, ... saami-wadaaggu waa -2
3. $3, 2, \frac{4}{3}, \frac{8}{9}, \dots$ saami-wadaaggu waa $\frac{2}{3}$
4. $16, -4, 1, -\frac{1}{4}, \dots$ saami-wadaaggu waa $-\frac{1}{4}$

Tibixda Guud Ee S.J

1. U qaado tibixda koowaad a saami wadaagguna waa r markaa S.J
 $a, ar, ar^2, \dots$

Waxqabadka 1aad

Waxa aan raadinaynaa jid lagu heli karo tibixda guud ee sunsun joometeri.

$$\text{Tibixda } n^{\text{aad}}, T_n = ar^{n-1}$$

Ogow, $a \neq 0, r \neq 0$

Sidoo kale $r \neq \pm 1$

Haddaba, tibixda T_n waxaa loo yaqaan tibixda guud ee S.J

2. Saami wadaagga waxaa lagu helaa

$$r = \frac{T_2}{T_1} = \frac{T_3}{T_2} = \dots = \frac{T_n}{T_{n-1}}$$

Tusaalaha 2aad: Waxa aan raadineynaa tibixda 6aad iyo tibixda n^{aad} ee S.J

soo socda:

$$1. \quad 4, -8, 16, -32, \dots$$

$$2. \quad 2, \frac{2}{3}, \frac{2}{9}, \frac{2}{27}, \dots$$

Furfuris

$$1. \quad 4, -8, 16, -32, \dots$$

$$a = 4, r = -\frac{8}{4} = -2$$

$$T_6 = ar^5$$

$$T_6 = 4 \times (-2)^5$$

$$T_6 = 4 \times -32$$

$$T_6 = -128$$

$$T_n = ar^{n-1}$$

$$T_n = 4(-2)^{n-1}$$

$$2. \quad 2, \frac{2}{3}, \frac{2}{9}, \frac{2}{27}, \dots$$

$$a = 2, r = \frac{1}{3}$$

$$T_6 = ar^5$$

$$T_6 = 2 \times \left(\frac{1}{3}\right)^5$$

$$T_6 = 2 \times \frac{1}{243}$$

$$T_6 = \frac{2}{243}$$

$$T_n = ar^{n-1}$$

$$T_n = 2 \left(\frac{1}{3}\right)^{n-1}$$

Tusaalaha 3aad: Haddii tibixda ugu danbeysa ee sunsun ay tahay $T_n = \left(\frac{2}{3}\right)^{n-1}$, haddaba:

1. Caddee in sunsunku yahay S.J
2. Tibixdee ah $\frac{64}{729}$?

Furfuris

1. Caddee in sunsunku yahay S.J

$$T_n = \left(\frac{2}{3}\right)^{n-1}$$

$$T_{n-1} = \left(\frac{2}{3}\right)^{(n-1)-1} = \left(\frac{2}{3}\right)^{n-2}$$

$$\frac{T_n}{T_{n-1}} = \frac{\left(\frac{2}{3}\right)^{n-1}}{\left(\frac{2}{3}\right)^{n-2}} = \frac{\left(\frac{2}{3}\right)^{n-2} \left(\frac{2}{3}\right)}{\left(\frac{2}{3}\right)^{n-2}} = \left(\frac{2}{3}\right)$$

Haddaba sunsunku waa S.J maadaama uu leeyahay saami wadaag sugan.

2. Tibixdee ah $\frac{64}{729}$

U qaado in $T_n = \frac{64}{729}$

$$\left(\frac{2}{3}\right)^{n-1} = \frac{64}{729}$$

$$\left(\frac{2}{3}\right)^{n-1} = \left(\frac{2}{3}\right)^6$$

$$n - 1 = 6$$

$$n = 7$$

Haddaba, $\frac{64}{729}$ waa tibixda 7aad

Waxqabadka 2aad

Qiimaha mashiin uu hadda joogo haddii uu yahay 40,000 dollar, islamarkaana qiimahiisu isdhimayo 10% sanadkii haddaba, waxa aan helaynaa qiimaha mashiinka ee sanadka lixaad

Tusaalooyin ku dabbagan S.J

1. Muumin waxa uu haystaa telefoon , waxa u uku shubtay 1GB oo xog ah bisha ugu horreysa, kadibna shirkada ayaa bilkasta xogta u laba-laabtay dhiiragalin macaamil dardar. Haddaba xogta waxa aad u qortaa sunsun joometric afar bilood .

Bisha 1= 1GB

Bisha 2 = 2GB

Bisha 3= 4GB

Bisha 4 =8GB

Bisha 5= 16 GB

Sunsun joomitriga= 1GB,2GB,4GB,8GB,16GB

2. Cabdi wuxuu go'aansaday inuu bil kasta keydsado lacag dhan \$10, isagoo lacagta bil kasta ku laba-laabayso tan tii hore.Haddaba waxa aad u qortaa sunsun joomitir shan bilood?

Furfuris

Bil 1: \$10

Bil 2: \$20

Bil 3: \$40

Bil 4: \$80

Bil 5: \$160

Sunsun joomitriga = \$10,\$20,\$40,\$80,\$160

3. Nal iftiin ah ayaa hoos u dhacaya itaalkiisa mar walba marka uu bir ku dhaco, iyadoo uu itaalka iftiinka nus noqdo ($\frac{1}{2}$) markasta oo uu bir ku dhaco.Haddaba haddii itaalka ilaysku yajay 100% ,waxa aad u qortaa sunsun joomitiriga.

Sunsun joomitiriga= 100%, 50%, 25%, 12,5%, 6.25%

Magaala tirada dadka ku bilowday 500, dadkuna wuxuu kordhaa saddex-laab (x3) sanad walba.

Furfuris

Sanad 1=500 qof

Sanad 2=1500 qof

Sanad 3 aad= 2000

Sanad 4aad=2500 qof

Layli

1. Raadi tibixda 8aad iyo tibixda ugu danbeysa ee S.J soo socda:

i. $5, 10, 20, 30, \dots$

ii. $27, -18, 12, -8, \dots$

iii. $\frac{1}{4}, \frac{1}{6}, \frac{1}{9}, \frac{2}{27}, \dots$

iv. $12, -6, 3, -\frac{3}{2}, \dots$

2. Raadi tibixda labada tibix ee ugu horeysa iyo tibixda 5aad ee S.J hoose:

i. $T_n = 7(3)^{n-1}$

ii. $T_n = 24\left(\frac{3}{4}\right)^{n-1}$

iii. $T_n = 5\left(\frac{1}{2}\right)^{n-2}$

iv. $T_n = -54\left(\frac{2}{3}\right)^{n-1}$

3. Haddii tibixda koowaad ee S.J tahay 24 tibixda 4aad ay tahay -81, haddaba raadi saami wadaagga iyo tibixda labaad.

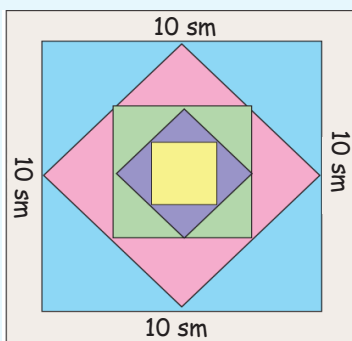
4. Haddii tibixda 4aad ee S.J tahay 15 tibixda 7aad ay tahay -960, haddaba raadi saami wadaagga iyo tibixda labaad.

4.4 Dareerin Joometeri

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay heli karaan wadarta S.J.

Waxqabadka 1aad

Waxa aan raadinaynaa wadarta bedadka labajibbaaraneyaasha iyo wadarta wareeggooda, haddii baraha kala bara dhinacyada labajibbaarane kasta laga sii sameeyo labajibbaarane kale sida ka muuqata jaantuuska.



Dareerin joometeri waxaa lagu helaa wadaraynta tibxaha S.J. marka aan dooneyno in aan wadarayno ilaa n tibxood waxa aynu u maraynaa tallaabooyinka hoose:

1. Si loo helo wadarta S.J ee 1, 2, 4, 8, 16, 32 waxa ay:

U qaadanaynaa

$$S = 1 + 2 + 4 + 8 + 16 + 32 \dots (1)$$

Waxa aynu ku dhufanaynaa 2

$$2S = 2 + 4 + 8 + 16 + 32 + 64 \dots (2)$$

Waxa aynu kala goynaynaa (2)-(1)

$$S = -1 + 64$$

$$S = 63$$

2. Waxa aynu eegaynaa S.J ee:

$$a, ar, ar^2, ar^3, \dots$$

Aynu kasoo qaadanno wadarta tibxaha in ay tahay S_n

$$S_n = a + ar + ar^2 + ar^3 + \dots + ar^{n-2} + ar^{n-1} \dots (1)$$

Waxa aynu ku dhufanaynaa isla'egta, saami wadaagga, r .

$$rS_n = ar + ar^2 + ar^3 + ar^4 + \dots + ar^{n-1} + ar^n \dots (2)$$

Waxa aynu kala goyneynaa (1)-(2)

$$S_n - rS_n = a - ar^n$$

$$S_n(1 - r) = a(1 - r^n)$$

$$S_n = \frac{a(1 - r^n)}{(1 - r)}, r < 1$$

Ama kala goo (2)-(1)

$$S_n = \frac{a(r^n - 1)}{(r - 1)}, r > 1$$

3. Xiriirka ka dhaxeeya T_n iyo S_n waa $T_n = S_n - S_{n-1}$

Tusaalaha 1aad: Waxa aan raadineynaa wadarta ilaa tibixda 8aad ee S.J

$$2 - 6 + 18 - 54 + \dots$$

Furfuris

$$a = 2, r = -3, n = 8$$

$$S_n = \frac{a(1 - r^n)}{(1 - r)}$$

$$S_8 = \frac{2(1 - (-3)^8)}{[1 - (-3)]}$$

$$S_8 = \frac{2(1 - 6561)}{4}$$

$$= \frac{2 \times (-6560)}{4} = -3279.5 \approx -3280$$

Tusaalaha 2aad: Haddii wadarta lixda tibix ee ugu horreeya ee S.J ay tahay 9 laabka wadarta saddexda tibix ee ugu horreeya, haddaba waxa aan raadineynaa saami wadaagga.

Furfuris

Wadarta lixda tibix ee ugu horreeya,

$$S_n = \frac{a(r^n - 1)}{(r - 1)}$$

$$S_6 = \frac{a(r^6 - 1)}{(r - 1)}$$

Wadarta saddexda tibix ee hore,

$$S_n = \frac{a(r^n - 1)}{(r - 1)}$$

$$S_3 = \frac{a(r^3 - 1)}{(r - 1)}$$

Wadarta lixda tibix ee hore waa saddex laabka wadarta saddexda tibix ee hore

$$S_6 = 9S_3$$

$$\frac{a(r^6 - 1)}{(r - 1)} = \frac{9a(r^3 - 1)}{(r - 1)}$$

$$\frac{a(r^6 - 1)}{(r - 1)} = \frac{9a(r^3 - 1)}{(r - 1)}$$

$$(r^6 - 1) = 9(r^3 - 1)$$

$$(r^3 + 1)(r^3 - 1) = 9(r^3 - 1)$$

$$r^3 + 1 = 9$$

$$r^3 = 8$$

$$r = 2$$

Haddaba, saami wadaaggu waa 2

Tusaalooyin ku dabbaqan dareerin joometeri

1. Cabdirisaaq wuxuu keydiyay lacagahan bil walba:

100, 200, 400, 800, 1600.

Waa maxay wadarta guud ee lacagaha uu keydiyay ilaa bisha 5aad?

2. Tuulo ayaa bilaabaysa olole wacyigelin ah iyadoo la qorsheynayo in dadka ay gaaraan 500, 250, 125, ... qof toddobaad walba.

Waa maxay wadarta guud ee dadka la gaari doono 6 toddobaad gudahood?

3. Wasarada waxbarashada ay dugsiyada dalka ugu deeqday buugaag dhan 500. Sanad kasta wasarada waxa ay laba laabta tirada buugaagta ay diraysa, haddaba waa immisa tirada buugaagta 5 sano gudahooda?

Sanadka 1 aad= 500

Sanadka 2aad= 1000

Sanadka 3aad= 2000

Sanadka 4 aad=4000

Sanadka 5 aad=8000

Wadarta buugaagta= 500+1000+2000+4000+8000=15500

Layli

1. Raadi wadarta sunsunka joometeri ee soo socda:
 - i. $2 + 4 + 8 + 16 + \dots$ ilaa 10 tibxood.
 - ii. $-3 + 9 - 27 + \dots$ ilaa 8 tibxood.
 - iii. $10 + 5 + \left(\frac{5}{2}\right) + \left(\frac{5}{4}\right) + \dots$ ilaa 9 tibxood.
 - iv. $2 + 4 + 8 + 16 + \dots$ ilaa 10 tibxood.
 - v. $x + x^3 + x^5 + \dots$ ilaa n tibxood.
2. Raadi wadarta ilaa n tibxood ee S.J hoose:
 - i. $6, 18, 54, \dots$
 - ii. $3, -\frac{3}{2}, \frac{3}{4}, \dots$
 - iii. $2, 3, \frac{9}{2}, \dots$
 - iv. $a, -a^2, a^3, \dots$
3. Tibxaha ugu horreeya ee S.J haddi ay yihiin 7, tibixda u danbeysana ay tahay 448, wadarta tibxaha oo dhan ay tahay 889, haddaba raadi saami wadaaggooda.
4. Raadi wadarta ilaa n tibxood ee S.J $4 + 6 + 9 + \dots$



Horudhac

Fikradda Taxanaha waxa ay soo billaabatay ku dhawaad qarnigii labaad dhalashadii nabi Ciise ka hor ee miilaadiga. Taxaneyaasha waxa ay inoo suuragaliyeen in aan furfurno habka ku dhisan isla'egyada toosan, Baabiliyiinta ayaa waxa ay baareen furfurka mas'alooyin la xariira isla'egyada wadajira.

Haddaba, isbadalladii ay soo mareen aragtiinnada taxaneyaasha, ayaa waxaa ka dhashay hababka loo adeegsado furfurka isla'egyada toosan. Taxaneyaashu waxa ay ka mid yihiin agabyada xooggan ee ay adeegsato xisaabta.

Haddaba, guud ahaan adeegsiga taxaneyaasha waxa aan ku arki karnaa nolol maalmeedkeenna. Tusaale ahaan, dhoolatusyada milatariga, daabuurka iskuulka, dhireynta iwm.

Aragtiinnada taxaneyaasha waxaa loo adeegsadaa qeybaha kale ee culuumta sida sayniska, hiddesidayaasha, cilmunafsiya iyo maamulka warshadaha. Sidoo kale waxaa loo adeegsadaa joometeriga, shabakadaha kombiyuutarrada, xiriirka, iwm.

Tusmada Cutubka

Cutubkaan waxa aan ku baran doonnaa casharada hoose:

1. Taxaneyaal
2. Xisaabfallada taxaneyaasha
3. Astamaha taxaneyaasha
4. Melmelka iyo sugaha taxanaha.

Ujeeddooyinka Cutubka

Dhammaadka cutubkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Qeexaan taxane.
2. Sheegaan noocyada kala duwan ee taxaneyaasha.
3. Furfuraan xisaabfallada taxaneyaasha.
4. Helaan melmelka taxane.
5. Xasaabin karaan sugaha taxane.
6. Sheegi karaan astamaha melmelka taxane.

5.1 Taxaneyaal

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Qeexaan taxane.
2. Dhisi karaan taxane
3. Sheegi karaan muujiyaha taxane.
4. Sheegaan noocyada Taxanaha .

Waxqabadka 1aad

Shaxda hoose waxa ay ku saabsan tahay dhibcaha uu Cali ka helay afar maaddo saddexdii sano ee tagtay.

Sanadka	Xisaab	Ingiriisi	Saynis	Cilmiga-Bulshada
1aad	48	71	80	62
2aad	70	68	91	73
3aad	77	84	95	82

Haddaba; Bare weydii ardayda su'aalaha soo socda:

1. Waa immisa dhibcaha uu Cali ka helay sayniskii 2aad?
2. Xisaabi wadarta guud ee dhibcaha uu helay sannadka 3aad?
3. Maaddadee ayuu Cali ka helay dhibcaha ugu hooseeya sanadkii 1aad?

Qeexid:

Taxane waa teedad laydisan ama waa kutirsaneyaal loo soo bandhigay jiiftax iyo joogtax ahaan, islamarkaana lagu ooday sakallo ama bilo.

Teedad laydisan oo tirooyin ah kuna oodan sakallo lammaansan sida

$$\begin{pmatrix} 2 & 3 & 7 \\ 1 & 4 & 5 \end{pmatrix} \text{ iyo } \begin{pmatrix} 1 & 3 & 1 \\ 2 & 1 & 4 \\ 4 & 7 & 6 \end{pmatrix} \text{ ayaa waxaa loo yaqaanaa } \mathbf{Taxane}.$$

Ku dhaxjirayaasha Taxanaha waxaa loo yaqaanaa ku tirsaneyaal. Baaxadda Taxanaha waxaa aalaaba lagu muujiyaa tirada joogtaxyada iyo jiiftaxyada ee Taxanaha asi leeyahay, sidoo kale Taxanaha waxaa lagu magacaabaa xarfo waawayn sida B, T, J, iwm. Kutirsaneyaashoodana xarfo yaryar sida b, t, j iwm. Tusaale ahaan,

$$B = \begin{pmatrix} 1 & 4 & 8 \\ 3 & 7 & 2 \end{pmatrix},$$

$$T = \begin{pmatrix} a & b \\ c & d \\ e & f \end{pmatrix},$$

$$J = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$$

2 jiiftax

3 joogtax

$$2 \times 3$$

3 jiiftax

2 joogtax

$$3 \times 2$$

2 jiiftax

1 joogtax

$$2 \times 1$$

Haddaba, Haddii taxane B uu leeyahay m jiiftax iyo n joogtax, waxaa loo muujiyaa sidatan, $B = m \times n$.

Waxqabadka 2aad

Shirkad ayaa waxa ay soo saartaa suuman iyo saacado. Haddii shirkaddu ay sannadkii 2008 samaysay 6500 oo suun iyo 900 oo saacadood, sanadkii 2009 na ay samaysay 7200 oo suun iyo 1100 saacadood, sanadkii 2010 kana ay samaysay 7300 oo suun iyo 1040 saacadood, haddaba, bare weydii ardayda in ay xogtaas ku muujiaayaan taxane, kadibna ay sheegaan muujiyaha Taxanaha as.

Taxane kasta oo ka kooban 3 jiiftax iyo 3 joogtax (3×3) aalaaba waxaa loo qoraa sidatan:

$$B = \begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix}$$

Tirada hoostaalla kutirsane kasta waxa ay ina tusaysaa booska uu kaga yaallo Taxanaha .

Waxqabadka 3aad

Bare weydii ardyada in ay sheegaan inta muujiye ama qaab ee uu yeelan karo taxane leh 12 kutirsane.

5.1 .1 Noocyada Taxaneyaasha

1. Taxane Laba jibbaaran

Taxane kasta oo tirada joogtaxyadiisu la mid tahay tirada jiiftaxyadiisa waxaa loo yaqaan **taxane laba jibbaaran**.

$\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ waa taxane laba jibbaaran, maadaama uu yahay 2×2 .

2. Taxane maran

Haddii dhammaan kutirsaneyaasha taxane ay yihiin eber waxaa la yiraahdaa **taxane maran**.

$\begin{pmatrix} 0 \\ 0 \end{pmatrix}$, $\begin{pmatrix} 0 & 0 & 0 \end{pmatrix}$, $\begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$ waa taxaneyaal maran.

3. Taxane Dhexroor

Haddii dhammaan ku tirsaneyaasha aan ku jirin dhexroorka taxanaha ay yihiin eber, waxaa la yiraahdaa taxane dhaxroor.

Tusaalaha ahaan,

$\begin{pmatrix} 1 & 0 \\ 0 & 4 \end{pmatrix}$ waa taxane dhaxroor oo laba jibbaaran 2×2

$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{pmatrix}$ waa taxane dhaxroor oo saddexjibbaaran jibbaaran 3×3

4. Taxane Asalmadoorshe

Haddii kutirsane kasta ee dhaca dhexroorka taxane uu yahay 1 inta kasoo hartayna wada yihiin eber, waxaa la yiraahdaa taxane asalmadoorshe.

Tusaale ahaan,

$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ waa taxane asalmadoorshe oo laba jibbaaran (2×2)

$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ waa taxane asalmadoorshe oo saddexjibbaaran (3×3)

5. Taxane Joogtax iyo taxane Jiiftax

Taxanihii hal jiiftax keliya leh waxaa la yiraahdaa **taxane jiiftax**.

Tusaalaha ahaan $(1 \ 2)$ iyo $(2 \ 4 \ 6)$ waa taxaneyaal jiiftax.

Sidoo kale taxanihii leh keliya hal joogtax waxaa la yiraahdaa **taxane joogtax**.

Tusaale ahaan, $\begin{pmatrix} 3 \\ 7 \end{pmatrix}$ iyo $\begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$ waa taxaneyaal joogtax.

6. Taxaneyaal isla'eg

Laba taxane waa ay isla'eygihiin haddii ay:

- Leeyihiin aaaddimo isku mid ah ($m \times n$)
- Isku mid yihiin xubnaha isku beegan.

Tusaalaha 1aad: Haddii $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 \\ -5 \end{pmatrix}$, Hadabo bare, weydii ardayda in ay raadiyaan qiimaha x iyo y

Furfuris

Maadaama taxaneyaasha isla'eg kutirsaneyaashooda isku beeggani isku mid yihiin, haddaba,

$$x = 3$$

$$y = -5$$

Tusaalaha 2aad: Haddii $\begin{pmatrix} 2 & -4 \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} x & y \\ 0 & 1 \end{pmatrix}$, haddaba bare, weydii ardayda in ay raadiyaan qiimaha x iyo y .

Furfuris

Maadaama taxaneyaasha isla'eg kutirsaneyaashooda isku beeggani isku mid yihiin, haddaba,

$$x = 2$$

$$y = -4$$

5.2 Xisaabfallada Taxaneyaasha

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. isugeyn karaan laba taxane.
2. Kala goyn karaan laba taxane.
3. Isku dhufan karaan laba taxane.
4. Isku dhufan karaan tiro iyo taxane.

5.2 .1 Isugeynta iyo Kala goynta taxaneyaasha

Waxqabadka 1aad

Website ay ku kaydsanyihiin cajalado diini ah ayaa waxaa loogala soo dagi karaa laba qaab: maqal ahaan iyo muuqaal ahaan, waxa ayna isugu jiraan muxaadaro iyo fatwo. Haddaba, shirkaddu waxa ay diiwan gelisay labadii maalin ee lasoo dhafay xogtan, maalintii 1aad waxaa laga dagsaday websiteka:

Muxaadaro 28 maqal ah iyo 14 muuqaal ah, Fatwo 56 maqal ah iyo 91 muuqaal ah. Maalintii labaad waxa ay xogta noqotay sidatan, Muxaadaro 24 maqal ah iyo 10 muuqaal ah, Fatwo 35 maqal ah iyo 82 muuqaal ah.

Haddaba waxa aan sheegayaa guud ahaan in muxaadari maqal ah iyo inta muxaadaro muuqaal ah ee ladagsay maalintii 1aad. Sidoo kale, in muxaadari maqal ah iyo inta muxaadaro muuqaal ah ee ladagsay maalintii 2aad, aniga oo adeegsanaya taxane.

Haddii labada taxane ee A iyo B yihiin isku isku aaddimo, markaa wadartooda waxaa loo qoraa sidatan $A + B$ waxaana la isugeeyaa kutirsaneyaasha isku beegan. Sidoo kale, faraqooduna waa $A - B$ waxaase xusid mudan in marka aan kala goyneyno laba taxane ay Taxanaha danbe summadihiiu is badalayaan kadibna aan isu geynneyno kutirsaneyaasha isku beegan.

Tusaalaha 3aad: Bare, weydii ardayda in ay raadiyaan wadarta labada taxane ee lagu siiyay:

$$A = \begin{pmatrix} 2 & -1 & 3 \\ 1 & 2 & 4 \\ 0 & 1 & 2 \end{pmatrix} \quad B = \begin{pmatrix} 1 & 0 & 2 \\ 3 & -1 & 0 \\ 2 & 1 & 4 \end{pmatrix}$$

Furfuris

Aadimaha taxanaha A waxa uu la'egyahay aaddimaha taxanaah B, Haddaba:

$$\begin{aligned} A + B &= \begin{pmatrix} 2 & -1 & 3 \\ 1 & 2 & 4 \\ 0 & 1 & 2 \end{pmatrix} + \begin{pmatrix} 1 & 0 & 2 \\ 3 & -1 & 0 \\ 2 & 1 & 4 \end{pmatrix} \\ &= \begin{pmatrix} 2+1 & -1+0 & 3+2 \\ 1+3 & 2-1 & 4+0 \\ 0+2 & 1+1 & 2+4 \end{pmatrix} = \begin{pmatrix} 3 & -1 & 5 \\ 4 & 1 & 4 \\ 2 & 2 & 6 \end{pmatrix} \end{aligned}$$

F.G:

Wadarta laba taxane oo kala aaddimo ah wali lama qeexin.

Waxqabadka 2aad

Bare, weydii ardayda in ay sheegaan taxaneyaasha hoose kuwa la isugeyn karo:

$$A = \begin{pmatrix} 1 & 2 & -3 \\ 4 & 1 & 5 \end{pmatrix} \quad B = \begin{pmatrix} 3 & -7 & 2 \\ 1 & 5 & 4 \end{pmatrix} \quad C = \begin{pmatrix} 1 & 9 \\ 8 & 7 \end{pmatrix}$$

Kadibna waxa aan ha hubiyaan isla'egyada hoose:

$$A + B = B + A$$

$$A + (B + C) = (A + B) + C$$

Tusaalaha 4aad: Bare, weydii ardayda in ay raadiyaan faraaqa taxaneyaasha $A - B$ haddii:

$$A = \begin{pmatrix} 3 & 5 \\ 2 & -3 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & 4 \\ 3 & 0 \end{pmatrix}$$

Furfuris

$$\begin{aligned}A - B &= \begin{pmatrix} 3 & 5 \\ 2 & -3 \end{pmatrix} - \begin{pmatrix} 1 & 4 \\ 3 & 0 \end{pmatrix} \\&= \begin{pmatrix} 3 & 5 \\ 2 & -3 \end{pmatrix} + \begin{pmatrix} -1 & -4 \\ -3 & 0 \end{pmatrix} \\&= \begin{pmatrix} 3-1 & 5-4 \\ 2-3 & -3-0 \end{pmatrix} \\&= \begin{pmatrix} 2 & 1 \\ -1 & -3 \end{pmatrix}\end{aligned}$$

5.2.2 Isku dhufashada taxane iyo tiro (foolwaa)

Waxqabadka 3aad

Faarax waxa uu daawaday telefishinka 8saacadood, moobeelkiisana 4 saacadood. Farxiya ayaa iyana sidoo kale daawatay telefishinka 6saacadood, moobeelkeedana 2 saacadood. Sitimaanka soo aaddan ayaa waxa ay doonayaan in ay daawadaan laba laabka tii hore. Haddaba, waxa aan raadinayaa saacadaha iyo isbadalka ku dhacaya aniga oo adeegsanaya taxane.

Marka aan dooneyno in aan taxane A ku dhufano tiro k oo loo qoro kA , waxa aan tirada ku dhufaneynaa kutirsane kasta oo uu taxanuhu leeyahay.

Tusaalaha 5aad: Haddii taxanaha $A = \begin{pmatrix} 1 & -2 \\ 4 & 3 \end{pmatrix}$ haddaba aan raadino:

1. $2A$
2. $-3A$

Furfuris

1. $2A$ waxa aan 2 ku dhufanaynaa kutirsane kasta ee taxanaha A :

$$A = \begin{pmatrix} 1 & -2 \\ 4 & 3 \end{pmatrix}$$

$$2A = \begin{pmatrix} 2 \times 1 & 2 \times -2 \\ 2 \times 4 & 2 \times 3 \end{pmatrix}$$

$$2A = \begin{pmatrix} 2 & -4 \\ 8 & 6 \end{pmatrix}$$

2. $-3A$ waxa aan -3 ku dhufanayaa kutirsane kasta ee taxanaha A:

$$A = \begin{pmatrix} 1 & -2 \\ 4 & 3 \end{pmatrix}$$

$$-3A = \begin{pmatrix} -3 \times 1 & -3 \times -2 \\ -3 \times 4 & -3 \times 3 \end{pmatrix}$$

$$-3A = \begin{pmatrix} -3 & 6 \\ -12 & -9 \end{pmatrix}$$

5.2 .3 Isku dhufashada Taxaneyaasha

Waxqabadka 4aad

Maqaaxi ayaa iibisa 3 shay: Kafee, Shaah, iyo Doolsho. Waxaa la diiwaangeliyay tirada la iibiyay labo maalmood.

Maalin	Kafee	Shaah	Doolsho
Isniin	30	20	10
Talaado	25	15	20

Qiimaha mid kasta waa \$5, \$3 iyo \$4 sida ay u kala horreeyaan. Haddaba, Bare u sheeg ardayda in ay xogtaaan u beddelaan taxane ayaga oo marka hore u kala qaadanaya A iyo B taxanayaasha Tirada alaabta la iibiyay iyo mid kasta qiimihiisa, ka dibna haka jawaabaan su'aalaha soo socda:

1. Raadi taranta labada taxane A (tirada alaabta) iyo B (qiimaha alaabta).
2. Waa maxay aaddimaha (order) taranta labada taxane A iyo B?
3. Waa maxay wadarta qiimaha iibka maalinta 1aad (isniin)?
4. Waa maxay wadarta qiimaha iibka maalinta 2aad (taalado)?

Taxanaha B waxaa la oran karaa waa lagu dhufan karaan Taxanaha B haddii haddii tirada joogtaxyada ee Taxanaha T ay la egtahay tirada jiiftaxyada taxanaha B.

Marka aynu dooneyno in aynu isku dhufanno laba taxane waxa aan marka hore baranaynaa sida hal jiiftax loogu dhufto hal joogtax.

$$(a \ b) \begin{pmatrix} c \\ d \end{pmatrix} = ac + bd$$

Tusaalaha 6aad: Fadlan bare weydii ardayda in ay raadiyaan taranta

$$(1 \ 2 \ 3) \begin{pmatrix} 2 \\ -1 \\ 4 \end{pmatrix}$$

Furfuris

Maadaama, tirada joogtaxyada taxanaha bidix ay la'egtahay tirada jiiftaxyada taxanaha midig waa la isku dhufan karaa.

$$\begin{aligned} (1 \ 2 \ 3) \begin{pmatrix} 2 \\ -1 \\ 4 \end{pmatrix} &= (1)(2) + (2)(-1) + (3)(4) \\ &= 2 - 2 + 12 \\ &= 12 \end{aligned}$$

Haddaba marka aan dooneyno in aan isku dhufanno laba taxane waxa aan adeegsan doonna fikradda (jiiftax ku dhufo joogtax) si aan u helno taranta taxaneyaasha.

Tusaalaha 7aad: Fadlan bare weydii ardayda in ay raadiyaan taranta labada taxane ee hoose:

$$A = \begin{pmatrix} 1 & 0 & 2 \\ 3 & -1 & 4 \end{pmatrix}, \text{ iyo } B = \begin{pmatrix} 1 & -3 \\ 5 & 1 \\ 4 & 2 \end{pmatrix}$$

Furfuris

Aaddimaha taxanaha A waa 2×3 , kan Bna waa 3×2 , haddaba:

$$AB = \begin{pmatrix} 1 & 0 & 2 \\ 3 & -1 & 4 \end{pmatrix} \begin{pmatrix} 1 & -3 \\ 5 & 1 \\ 4 & 2 \end{pmatrix}$$

$$AB = \begin{pmatrix} 1 \times 1 + 0 \times 5 + 2 \times 4 & (1 \times -3) + 0 \times 1 + 2 \times 2 \\ 3 \times 1 + (-1 \times 5) + 4 \times 4 & (3 \times -3) + (-1 \times 1) + 4 \times 2 \end{pmatrix}$$

$$AB = \begin{pmatrix} 1 + 0 + 8 & -3 + 0 + 4 \\ 3 - 5 + 16 & -9 - 1 + 8 \end{pmatrix}$$

$$AB = \begin{pmatrix} 9 & 1 \\ 14 & -2 \end{pmatrix}$$

F.G:

Kutirsanha 1aad ee jiiftaxa 1aad iyo joogtaxa 2aad ee taranta AB waa wadarta tarannada kutirsaneyaasha jiiftaxa koowaad ee taxanaha **A** iyo kutirsaneyaasha joogtaxa koowaad ee taxanaha **B**.

Labada taxane ee *A* iyo *B* waxa keliya oo la isku dhufan karaa haddii tirada joogtaxyada *A* ay la egtahay tirada jiiftaxyada *B*. muujiyaha tarantooduna waxa ay noqonaysaa tirada jiiftaxyada *A* iyo tirada joogtaxyada *B*. Matalan taranta kore muujiyeheedu waa 2×2 .

Waxqabadka 5aad

Waxa aan raadinayaa taranta *TJ* iyo *JT* iyo muujiyaha tarannada taxaneyaasha hoose:

$$T = \begin{pmatrix} 2 & 1 & 0 \\ 3 & 2 & 1 \end{pmatrix}, \quad J = \begin{pmatrix} 4 & 2 \\ 3 & 1 \end{pmatrix}$$

5.3 Astaamaha Taxaneyaasha

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Sheegaan astaamaha taxaneyaasha.
2. Adeegsan karaan astaamaha taxaneyaasha.

Astaamaha soo socda waxa ay ku dabaqanyihiin taxaneyaasha kala ah A, B iyo C haddii ay wada qeexanyihiin.

1. Isku dhufashada taxaneyaasha malahan astaanta kala hormarinta.

$$AB \neq BA$$

2. Isku dhufashada taxaneyaasha waxa ay leedahay astaantah hormagelinta.

$$A(BC) = (AB)C$$

3. Isku dhufashada taxaneyaasha waxa ay leedahay astaanta kaladhigga ee ku darta.

$$A(B + C) = AB + AC$$

Ogow in haddii taxane laba jibbaaran laftiisa la isku dhufto waxaa qeexaa $A^2 = AA, A^3 = AAA$

Waxqabadka 1aad

Bare, ayaga oo adeegsanaya taxaneyaasha hoose, ardaydu ha caddeeyaan dhammaan astaamaha kore.

$$A = \begin{pmatrix} 1 & -2 \\ 3 & 0 \end{pmatrix}, \quad B = \begin{pmatrix} 2 & 1 \\ -4 & 3 \end{pmatrix}, \quad C = \begin{pmatrix} -3 & 0 \\ 1 & 2 \end{pmatrix}$$

Tusaalaha 8aad: Haddii $D = \begin{pmatrix} -2 & 0 \\ 0 & 3 \end{pmatrix}$, haddaba bare, weydii ardayda in ay raadiyaan D^2, D^3 .

Furfuris

$$D = \begin{pmatrix} -2 & 0 \\ 0 & 3 \end{pmatrix}$$

$$D^2 = \begin{pmatrix} -2 & 0 \\ 0 & 3 \end{pmatrix} \begin{pmatrix} -2 & 0 \\ 0 & 3 \end{pmatrix}$$

$$D^2 = \begin{pmatrix} 4 & 0 \\ 0 & 9 \end{pmatrix}$$

$$D = \begin{pmatrix} -2 & 0 \\ 0 & 3 \end{pmatrix}$$

$$D^3 = D^2 \cdot D = \begin{pmatrix} 4 & 0 \\ 0 & 9 \end{pmatrix} \begin{pmatrix} -2 & 0 \\ 0 & 3 \end{pmatrix} = \begin{pmatrix} -8 & 0 \\ 0 & 27 \end{pmatrix}$$

Tusaalaha 9aad: Haddii $A = \begin{pmatrix} 1 & 1 & -1 \\ 0 & -2 & 3 \\ 0 & 0 & 1 \end{pmatrix}$ haddaba bare, ardaydu ha

hubiyaan in $A^2 = -A + 2I$, halka $I = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$.

Furfuris

$$A = \begin{pmatrix} 1 & 1 & -1 \\ 0 & -2 & 3 \\ 0 & 0 & 1 \end{pmatrix}$$

$$A^2 = \begin{pmatrix} 1 & 1 & -1 \\ 0 & -2 & 3 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 1 & -1 \\ 0 & -2 & 3 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 1 & -1 & 1 \\ 0 & 4 & -3 \\ 0 & 0 & 1 \end{pmatrix}$$

$$-A - 2I = -\begin{pmatrix} 1 & 1 & -1 \\ 0 & -2 & 3 \\ 0 & 0 & 1 \end{pmatrix} + 2\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 1 & -1 & 1 \\ 0 & 4 & -3 \\ 0 & 0 & 1 \end{pmatrix}$$

Haddaba, $A^2 = -A + 2I$

Waxqabadka 2aad

Waxa aan hubinaynaa in $A^4 = -5A + 6I$, annaga oo adeegsanayna isla taxaneyaasha hoose,

$$A = \begin{pmatrix} 1 & 1 & -1 \\ 0 & -2 & 3 \\ 0 & 0 & 1 \end{pmatrix}, I = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

5.4 Melmelka iyo Sugaha Taxane

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Qeexi karaan melmelka iyo sugaha taxane.
2. Adeegsan karaan astaamaha melmelka taxane.

Marka aan raadinayno melmelka taxanaha A waa taxane ay jiftaxyadiisu yihiin joogtaxyada A , joogtaxyadiisuna yihiin jiftaxyada taxanaha A . Haddaba melmelka A waxaa loo qoraa A^m .

Tusaalaha 10aad: Haddii taxanaha $A = \begin{pmatrix} 3 & 1 & 2 \\ 0 & 5 & 6 \\ 7 & 4 & 9 \end{pmatrix}$, haddaba aan

raadino A^m .

Furfuris

Si loo helo melmelka taxanaha, waxaan isku badeleynaa jiftaxayada iyo joogtaxyada.

$$A = \begin{pmatrix} 3 & 1 & 2 \\ 0 & 5 & 6 \\ 7 & 4 & 9 \end{pmatrix}$$
$$A^m = \begin{pmatrix} 3 & 0 & 7 \\ 1 & 5 & 4 \\ 2 & 6 & 9 \end{pmatrix}$$

5.4 .1 Astaamaha Melmelka Taxanaha

Melmelka taxane waxa uu leeyahay astaamaha soo socda:

1. $(kA)^m = kA^m$
2. $(A^m)^n = A^{mn}$
3. $(A \pm B)^m = A^m \pm B^m$
4. $(AB)^m = B^m A^m$

Waxqabadka 1aad

Waxa aan adeegsaneynaa taxaneyaasha hoose si aan u hubino astaamaha

kore oo dhan. $A = \begin{pmatrix} 1 & 3 & 0 \\ 0 & 2 & 4 \\ 5 & 0 & 6 \end{pmatrix}$, $B = \begin{pmatrix} 2 & 0 & 7 \\ 0 & 3 & 9 \\ 1 & 8 & 0 \end{pmatrix}$

5.4 .2 Sugaha Taxane (2×2)

Sugaha taxane muujiyehiisu yahay 2×2 waxaa loo tibaaxaa sidatan:

$$\begin{vmatrix} b & t \\ j & x \end{vmatrix} = bx - jt$$

Tusaalaha 11aad: Waxa aan raadinaynaa sugaha taxanaha $\begin{pmatrix} 3 & 2 \\ 9 & 5 \end{pmatrix}$

Furfuris

Sugaha waa sidatan

$$\begin{vmatrix} 3 & 2 \\ 9 & 5 \end{vmatrix} = 3 \times 5 - 9 \times 2 = 15 - 18 = -3$$

Tusaalaha 12aad: Waxa aan raadinaynaa sugaha hoose:

$$\begin{vmatrix} 1 & -2 \\ 3 & 7 \end{vmatrix}$$

Furfuris

Sugaha waa sidatan

$$\begin{vmatrix} 1 & -2 \\ 3 & 7 \end{vmatrix} = 1 \times 7 - (-2 \times 3) = 7 + 6 = 13$$

Layli

1. Haddii $A = \begin{pmatrix} -1 & 3 & 2 \\ 7 & -5 & -4 \\ 6 & 2 & -1 \end{pmatrix}$, $B = \begin{pmatrix} 3 & 0 & 2 \\ -4 & 3 & 6 \\ 1 & -5 & 4 \end{pmatrix}$, haddaba raadi:

i. $A + B$

ii. $2A + 3B$

iii. $A - 2B$

2. Haddii $A = \begin{pmatrix} 5 & -1 \\ -2 & 3 \end{pmatrix}$, $B = \begin{pmatrix} -8 & 4 \\ 4 & -6 \end{pmatrix}$, $C = \begin{pmatrix} -2 & 3 \\ 5 & 3 \end{pmatrix}$, haddaba hubi in $(A + B) + C = A + (B + C)$

3. Raadi taranta taxaneyaasha hoose:

i. $\begin{pmatrix} 3 & 6 \\ -4 & -5 \end{pmatrix} \begin{pmatrix} 3 \\ 4 \end{pmatrix}$

ii. $\begin{pmatrix} 2 & 1 \end{pmatrix} \begin{pmatrix} 4 \\ 5 \end{pmatrix}$

iii. $\begin{pmatrix} -5 & -3 & 2 \\ 6 & 7 & -4 \end{pmatrix} \begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix}$

iv. $\begin{pmatrix} 1 & -1 & 2 \\ 2 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 2 & 0 \\ -1 & 0 & 2 \\ 2 & 1 & -1 \end{pmatrix}$

4. Haddii $A = \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 2 & 0 \\ 1 & 1 \end{pmatrix}$, $C = \begin{pmatrix} 1 & -1 \\ 2 & 0 \end{pmatrix}$, haddaba raadi:

i. AB

ii. BA

iii. $A(B + C)$

iv. $B(2A + 3C)$

5. Haddii $A = \begin{pmatrix} 3 & -1 & 2 \\ -1 & 0 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 4 \\ 5 \\ 6 \end{pmatrix}$, $C = \begin{pmatrix} 2 & 1 \\ 3 & 5 \end{pmatrix}$ haddaba raadi:

i. AC

ii. CA

iii. AB

iv. BA

6. Haddii $D = \begin{pmatrix} 2 & -3 \\ -2 & 1 \end{pmatrix}$ haddaba,

i. Raadi muujiyaha D

ii. Haddii $D^2 - 3D - kI = 0$ raadi qiimaha k .

7. Furfur taxaneyaasha hoose:

i. $\begin{pmatrix} 2 & 4 \\ -3 & 5 \end{pmatrix} + \begin{pmatrix} 2 & -5 \\ -4 & 3 \end{pmatrix}$

ii. $\begin{pmatrix} 6 & 8 \\ 4 & -6 \\ 9 & -1 \end{pmatrix} + \begin{pmatrix} 0 & 3 \\ -5 & -6 \\ 1 & -4 \end{pmatrix}$

iii. $\begin{pmatrix} -5 & -3 \\ 7 & 2 \end{pmatrix} - \begin{pmatrix} 4 & 3 \\ 8 & 1 \end{pmatrix}$

iv. $\begin{pmatrix} 6 & -9 \\ 4 & -3 \\ 0 & 7 \end{pmatrix} + \begin{pmatrix} 1 & -5 \\ 3 & -8 \\ -1 & 2 \end{pmatrix}$

v. $2 \begin{pmatrix} 3 & 8 & -4 \\ 1 & -6 & 7 \end{pmatrix}$

vi. $\frac{1}{4} \begin{pmatrix} 4 & -8 \\ 0 & -6 \end{pmatrix}$

8. Waxa aad heysataa taxanayaasha hoose:

$$A = \begin{pmatrix} 9 & 8 \\ 10 & 9 \end{pmatrix}, B = \begin{pmatrix} 2 & 5 \\ 3 & 8 \end{pmatrix}, C = \begin{pmatrix} -7 & 10 \\ -3 & 4 \end{pmatrix} \text{ Hadaba raadi:}$$

i. A^m

ii. $|A|$

iii. B^m

iv. C^m

v. $|B|$

vi. $|C|$

vii. $|AB|$

viii. $|AC|$

ix. $|BC|$

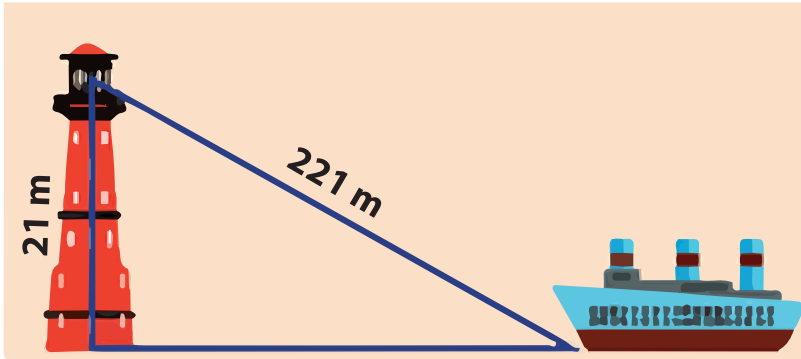
x. $(AB)^m$

xi. ABC

xii. $A + B + C$

xiii. $(A - B) + C$

Cutubka 6aad: Joometeria



Horudhac

Sida aan wada ognahay cilmiga joometeriga waxaa loo adeegsadaa nolosha meela badan oo ka mid ah. Haddaan eegno dhismayaasha nagu hareereysan waxa aan arkaynaa qaabab kale duwan oo joometeri ah.

Cutubkaan waxa aan ku baran doonnaa saddex-xagallada iyo geesoolayaasha.

Tusmada cutubka

Cutubkaan waxa aan ku baran doonnaa casharada hoose:

1. Saddexagal
2. Noocyada saddexagal
3. Geesoole

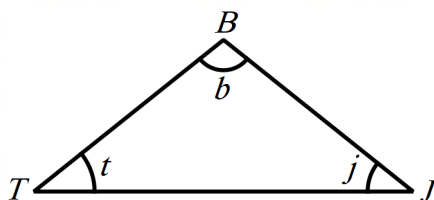
Ujeeddooyinka cutubka:

Dhammaadka cutubkaan, bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Sawiri karaan saddexagal.
2. Sheegi karaan noocyada saddexagalka.
3. Qeexi karaan geesoole.
4. Sheegi karaan xaglaha geesoolaha.

6.1 Saddexagal

Saddexagalku waa shaxan sallax oodan ah islamarkaana leh saddex dhinac. Shaxanka hoose waxa uu ina tusayaa shaxan saddexagal ah.



Calaamadda xaglaha waxa ay tuseysa in ay isle'gyihiin.

Baraha B, T iyo J waxaa loo yaqaan geesaha saddexagalka.

Haddaba, marka aan magacaabayno saddexagalka kore, waxa an adeegsaneynaa geesihisa.

Tusaale ahaan, saddexagalka BTJ ama ΔBTJ , halka Δ ay u taagantahay saddexagal.

Xaglaha b , t iyo j oo dhex dhaca saddexagalka BTJ waxaa loo yaqaan xaglo gudeed.

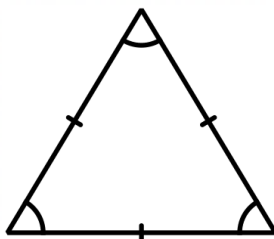
6.2 Kala soocidda saddexagallada:

Sadexagallada waxaa loo kala saaraa ayada oo loo eegayo dhinacyadooda ama cabbirka xaglahooda.

6.2 .1 Ku kala soocidda dhinacyada

1. Saddexagal simman.

Dhammaan saddexagallada leh dhinacyo isla'eg ayaawaxaa loo yaqaan saddexagal siman. Sidoo kale dhammaan xagalihiisuna wa ay isla'egyihiin.

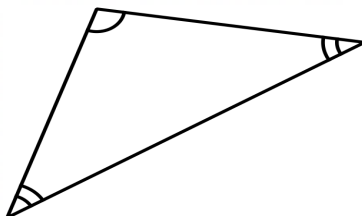


2. Saddexagal labaale ah:

Dhammaan saddexagallada leh laba dhinac oo isla'eg ayaa waxaa la yiraahdaa saddexagallo labaale ah. Xaglo saleedyada saddexagal labaale ah waa labada xaglood ee ka soo horjeeda dhinacyada isla'eg islamarkaana waa ay isla'eg yihiin labadaas xaglood.

3. Saddaxagal isma la'eke ah:

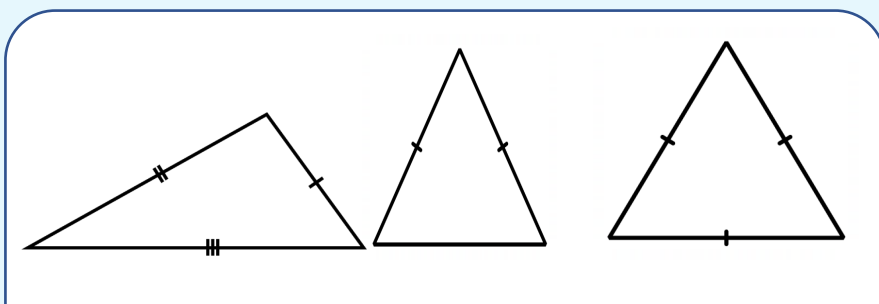
Saddexagal kasta oo leh dhinacyo cabbirkoodu kala duwan yahay ayaa waxaa loo yaqaanaa saddexagal isma la'eke ah. Sidoo kale dhammaan xaglihiisu waa ay kala duwan yihiin.



Haddaba, waxa aan oran karnaa markii la kala soocayo saddexagallada in la adeegsan karo cabbiraadda dhinacyadiisa kadibna loo kala sooci karo: saddexagal siman, saddexagal labaale ah, iyo saddexagal isma la'eke ah.

Waxqabadka 1aad

Bare, weydii ardayda in ay sheegaan noocyada saddexagladda hoos ku xusan, ayaga oo aan cabbiraynin dhinacyadooda.



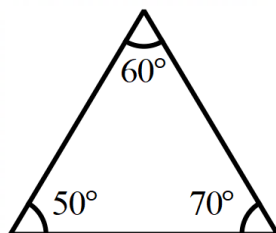
6.2 .2 Ku kala soocidda xaglaha:

Marka aan doonayno in aan kala soocno saddexagallada horay waxa aan u soo barannay in loo eego dhinacyadiisa, iminkase waxa aynu u eegaynaa xaglihiisa.

Haddaba, marka la eegayo xaglaha, noocyda saddexagallada waa:

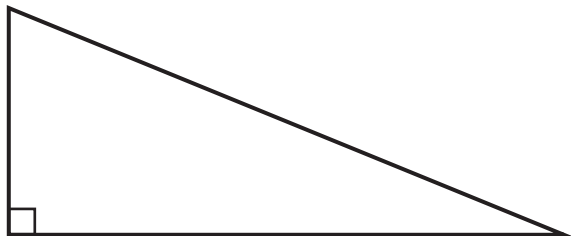
1. Saddexagal fiiqan

Saddexagal kasta oo ay dhammaan xaglihiisu fiiqanyihiin, cabbirka xagalkastana uu ka yaryahay 90° ayaa waxaa loo yaqaanaa saddexagal fiiqan. Sida midka kuu muuqda.



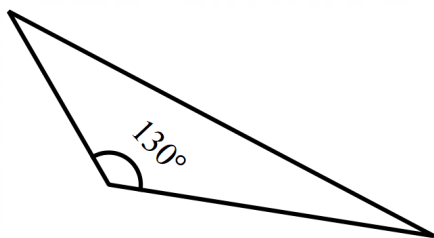
2. Saddexagal Qumman

Saddexagal kasta oo leh hal xagal oo quman (90°) ayaa waxaa loo yaqaanaa saddexagal qumman. Sawirka hoose waa saddexagal quman.



3. Saddexagal furan

Saddexagal kasta oo ay xagal ka mid ah xaglihiisu ka wayntahay 90° ayaa waxaa la yiraahdaa saddexagal furan. Sida kan hoos kaaga muuqda.

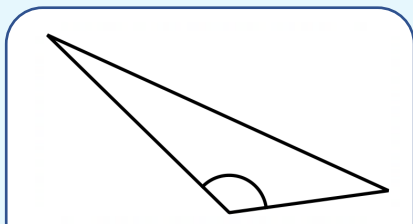


Waxqabadka 2aad

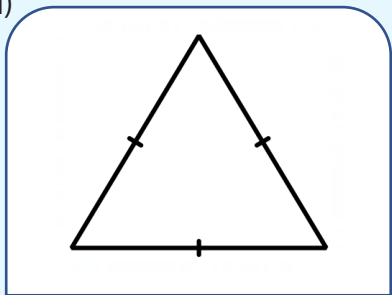
Bare, weydii ardayda in ay kala soocaan saddexagallada soo socda, ayaga oo ka eegaya:

- Dhererka dhinacyada ama
- Cabbirka xaglaha.

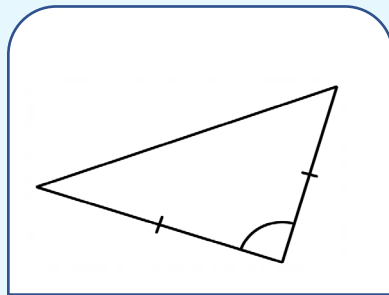
i)



ii)



iii)

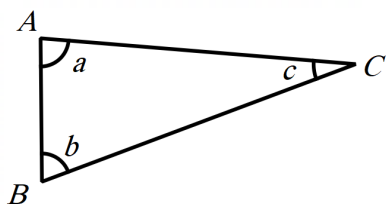


6.3 Wadarta xaglahaa gudaha ee saddexagal

Wadarta xaglahaa gudaha ee saddexagal waa 180° .

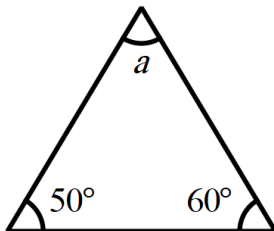
Waxqabadka 1aad

Bare, u sheeg ardayda in ay sawiraan saddexagal, ka dibna cabbiraan xaglihiisa kadibna ha raadiyaan wadarta xaglahiisa, gudaha.



Haddaba, $\angle a + \angle b + \angle c = 180^\circ$

Tusaalaha 1aad: Bare, weydii ardayda in ay raadiyaan qiimaha ($\angle a$) ee shaxanka hoose:



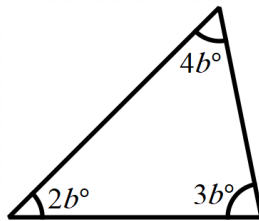
Furfuris:

$$\angle a + 50^\circ + 60^\circ = 180^\circ \quad (\text{Wadarta } \angle \text{ ee } \Delta)$$

$$\angle a + 110^\circ = 180^\circ$$

$$\begin{aligned}\angle a &= 180^\circ - 110^\circ \\ &= 70^\circ\end{aligned}$$

Tusaalaha 2aad: Bare, waydii ardayda in ay raadiyaan qiimaha b ee shaxanak hoose:



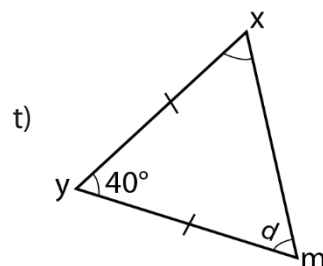
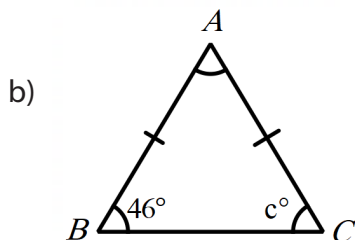
Furfuris:

$$2b^\circ + 3b^\circ + 4b^\circ = 180^\circ \quad (\text{Wadarta } \angle \text{ ee } \Delta)$$

$$9b^\circ = 180^\circ$$

$$b^\circ = 20^\circ$$

Tusaalaha 3aad: Bare, waydii ardayda in ay raadiyaan qiimaha xaglaha maqan ee la summadeeyay.



Furfuris:

b) $\triangle ABC$ waa labaale

$$\therefore \angle c = 46^\circ (\angle \text{saleed})$$

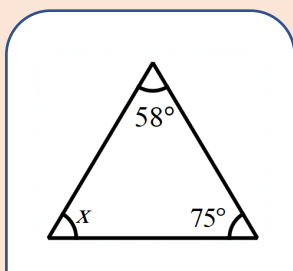
t) $\triangle XYM$ waa labaale

$$\therefore \angle d = \frac{180^\circ - 40^\circ}{2} = \frac{140^\circ}{2} = 70^\circ$$

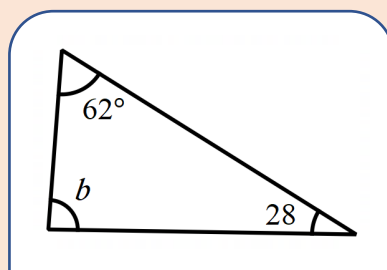
Layli

1. Raadi qiimaha xaglaha maqan.

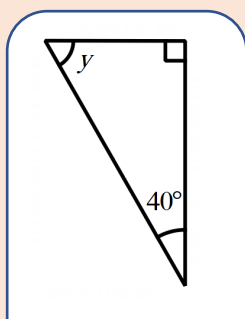
b)



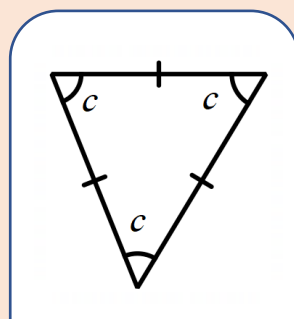
t)



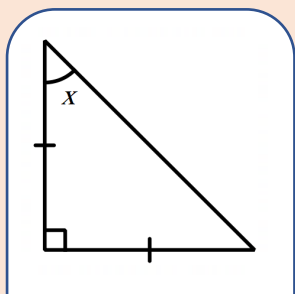
j)



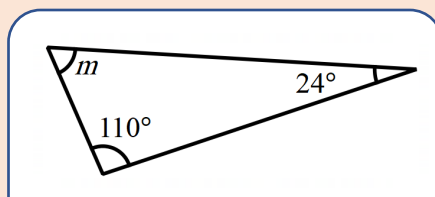
x)



kh)

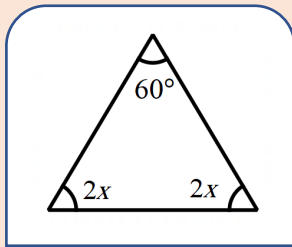


d)

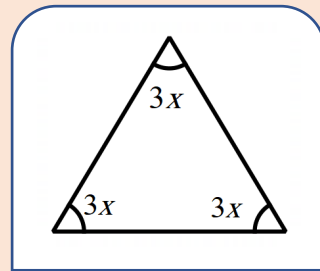


2. Raadi qiimaha xagasha x

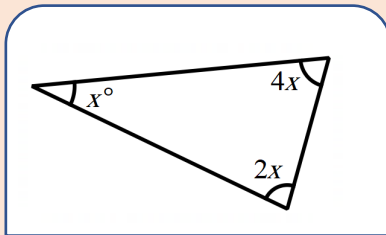
b)



t)



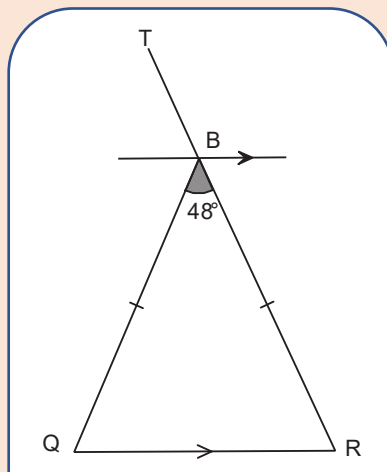
j)



2. Haddii BQR yahay Δ labaale ah, $BQ = BR$, $\angle QBR = 48^\circ$, BS ay barbarro la tahay QR sidoo kale TBR yahay xarriiq toosan, Haddaba xisaabi.

b) $\angle QRB$

t) $\angle TBS$



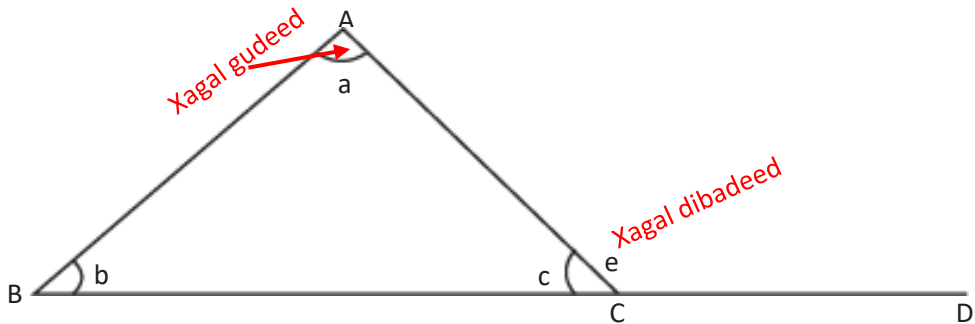
6.4 Xaglo dibadeedka saddexagal

Waxqabadka 1aad

1. Waxa aan sawiraynaa saddexagal.
2. kadibna dhinac ayaan fidineynaa.
3. ka dibna waxa aan cabbiraynaa labada xagal gudeed ee iska soo horjeeda kana soo horjeeda xagasha deriska la ah xagal dibadeedka.
4. kadibna waxa aan la barbardhigaynaa cabbirka xagal dibadeedka.

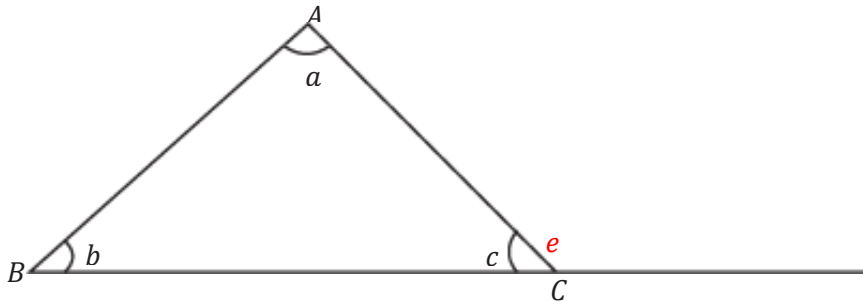
Waxa aan horay usoo sheegnay in xaglaha dhaca gudaha saddexagalka la yiraahdo xaglo gudeedyo. Haddaba casharkaan waxa aan ku baranaynaa xaglaha dhaca dibadda saddexagalka kuwaasoo loo yaqaan xaglo dibadeedyo.

Bal aynu eegno saddexagalka hoose:



Xaglaha a, b , iyo c waxaa la yiraahda xaglo gudeed halka xaglaha $\angle d, \angle e$ loo yaqaanno xaglo gudeed iska soo horjeeda.

Marka aynu doonayno in aynu ogaanno xirriirka ka dhaxeeya xaglo gudeedyada iska soo horjeeda iyo xaglo dibadeedka waxa aynu eegaynaa shaxanka hoose:

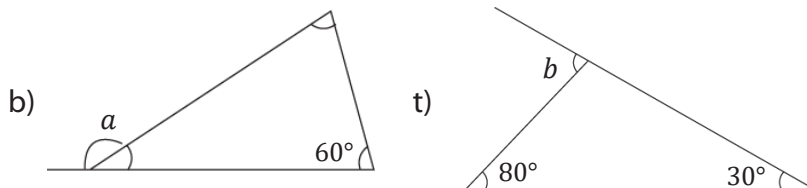


Aragtiin:

Xagal dibadeedka saddexagal waxa ay la'egtahay wadarta labada xagal gudeed ee aan dariska la'ahayn.

$$\therefore \angle e = \angle a + \angle b$$

Tusaalaha 4: Bare, waydii ardayda in ay raadiyaan qiimaha xagasha maqan ee lagu muujiyay xarfaha.



Furfuris

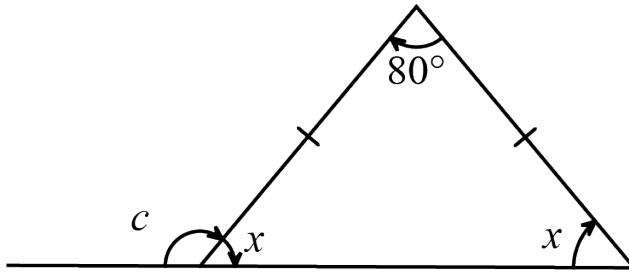
b) $\angle a = 90^\circ + 60^\circ$ (xagal dibadeed ka Δ)

$$\angle a = 150^\circ$$

t) $\angle b = 80^\circ + 30^\circ$ (xagal dibadeed Δ)

$$= 110^\circ$$

Tusaalaha 5aad: Bare, waydii ardayda in ay raadiyiaan qiimaha xagasha $\angle c$ ee shaxanka hoose



Furfuris

Annaga oo og wadrtu xagla gudeedka ee saddexagalka waa 180° ,

$$x + x + 80^\circ = 180^\circ$$

Haddaba;

$$\angle x = \frac{180^\circ - 80^\circ}{2} (\angle \text{saleedka } \Delta)$$

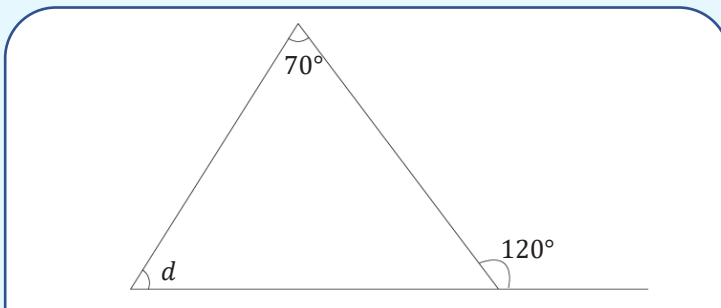
$$= \frac{100}{2} = 50^\circ$$

$$\therefore \angle c = 80^\circ + 50^\circ (\text{xagal dibadeed } \Delta)$$

$$= 130^\circ$$

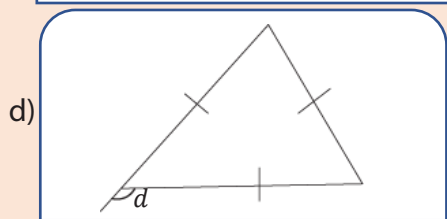
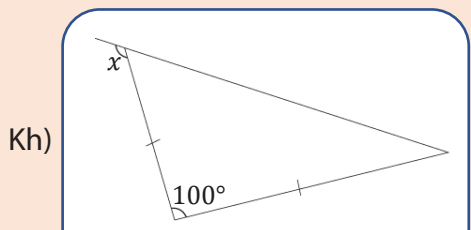
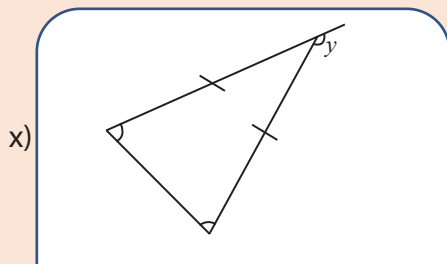
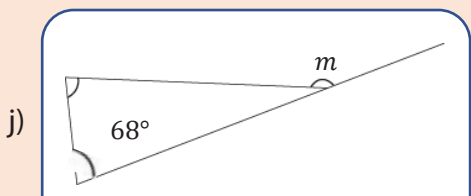
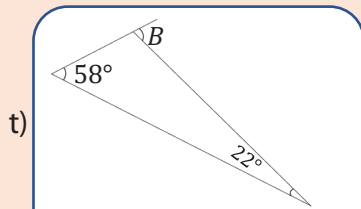
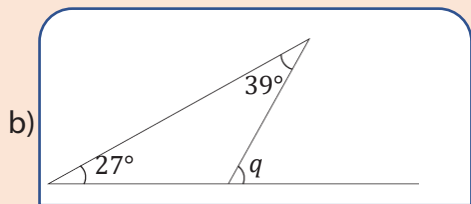
Waxqabadka 2aad

Bare, waydii ardayda in ay helaan qiimaha $\angle d$ ee shaxanka hoose:

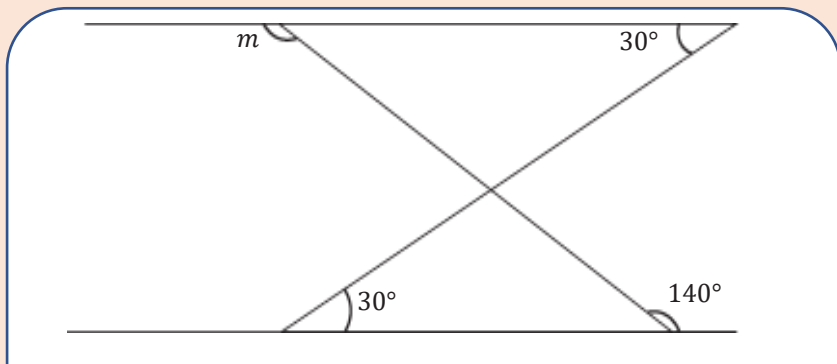


Layli

1) Raadi qiimaha xagasha maqan ee la calaamadeeyay



2) Raadi xagasha la calaamadeeyay ee shaxanka hoose:



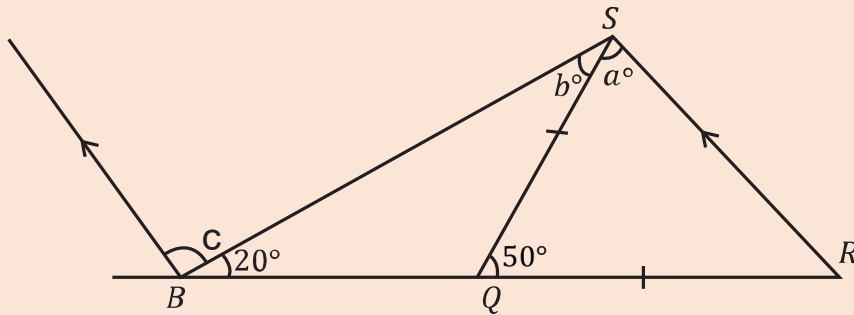
3) Shaxanka hoose, haddii BQR ay tahay xarriiq toosan, $QR=QS$, TB ay barbarro la tahay SR.

$\angle RQS = 50^\circ$, iyo $\angle QBS = 20^\circ$, haddaba raadi qiimaha xarfaha soo socda.

b) a

t) b

j) c

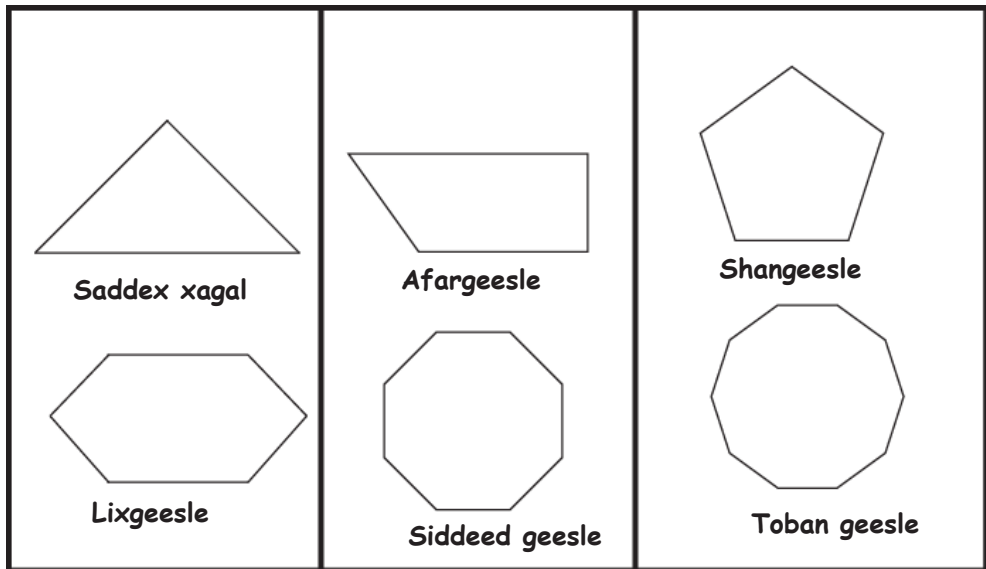


6.5 Geesooleyaasha iyo Astaamahooda

6.5 .1 Qeexidda Geesoole

Geesoole waa sallax oodan oo ka kooban saddex xariijin ama ka badan. Marka geesoole la magacaabay waxaa loo eegaa inta dhinac ee uu leeyahay.

Tusaale ahaan, Geesoolaha saddexda dhinac leh waxaa loo yaqaan saddexagal, geesoolaha afarta dhinac lehna waxaa loo yaqaan afar geesle. Tusaha hoose ayaa ina tusaya geesooleyaal kala duwan:



Geesooleyaasha leh in ka badan 10 dhinac, keliya waxa aan qoraynaa tirada dhinacyadooda. Tusaale ahaan, haddii uu geesoole yeesho 11 dhinac waxaa la yiraahdaa 11 geesoole, haddii uu 15 dhinac yeeshana waxaa la yiraahdaa 15 geesoole.

Haddaba, geesooleyaasha waxa ay wadaagaan astaaamaha hoose:

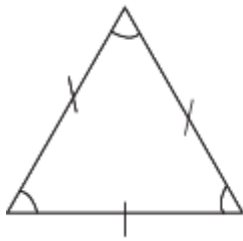
- Barkasta oo ay laba dhinac ku kulmaan waxaa la yiraahdaa gees.
- Xagal kasta oo dhex dhacda geesoolaha waxaa la yiraahdaa xagal gudeed.
- Xarriijin kasta oo isku xirta laba gees kasta oo aan deris aheyn waxaa la yiraahdaa dhexroor.

Waxqabadka 1aad

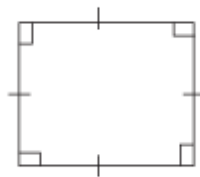
Bare, waydii ardayda in ay sawiraan shangeesoole Kadibna waxa aan magacaabayaa geesihiisa, dhinacyadiisa iyo dhexroorradiisa ayaga oo sawir ku wada muujinaya.

6.5 .2 Noocyada Geesoolaha

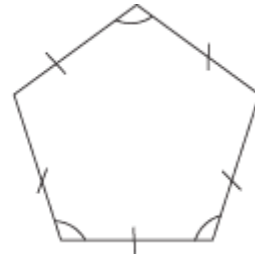
Annaga oo u eegayna dhinacyada iyo xagla-gudeedyada ayaa geesoolaha waxa aan u kala sooci karnaa laba qeybood oo kala ah geesoole qaabsan iyo geesoole aan qaabsaneyn (aan qaabsameyn).



Saddexagal isla'eke(siman)

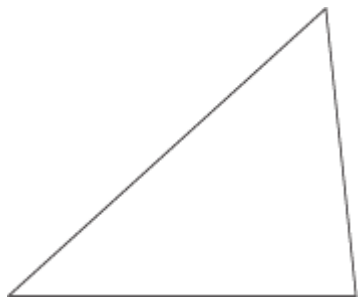


Laba jibbaarane

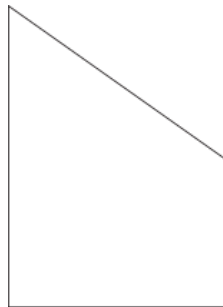


Shan geesle qaabsan

Shaxannada soo socda waxa ay tilmaamayaan geesooleyaal aan qaabsameyn.



Saddexagal



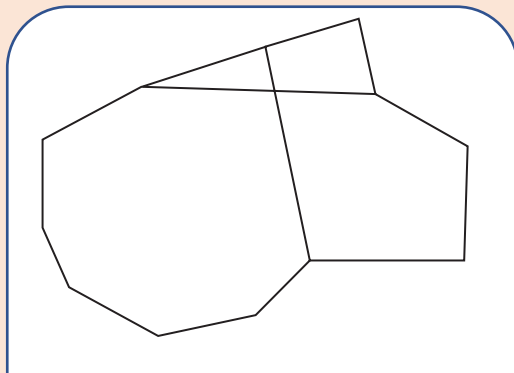
Afargeesle aan qaabsameyn

Waxqabadka 2aad

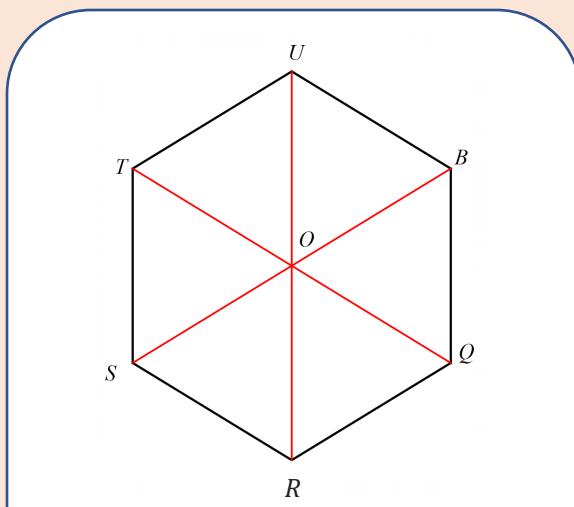
Bare, waydii ardayda in ay sheegaan inta dhexroor ee uu yeelan karo Geesoole leh 50 dhinac.

Layli

1. Magacaaw inta geesoole ee ku jirta shaxanka hoose:

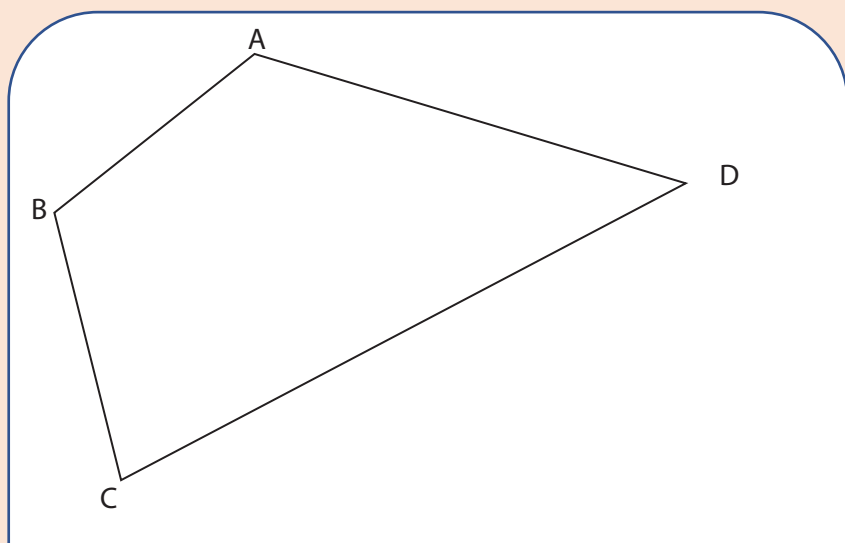


2. Lix geesle-qaabsan ayaa dhexrooradiisu iska jaraan barta O, waxa uuna leeyahay $OB = OR = OQ = OS = OT = OU$



- Raadi
 - b) Xagasha a ,
 - t) xagasha b
- Waa nooc ee saddexagla OBQ
- Waa nooc ee afargeeslaha $BQRS$

3. Qor dhammaan dhexroorrada geesoolaha hoose.

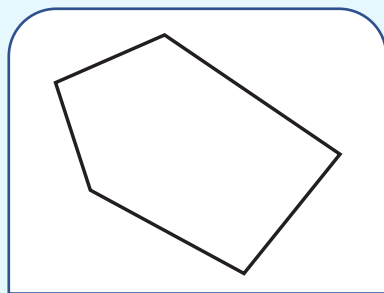
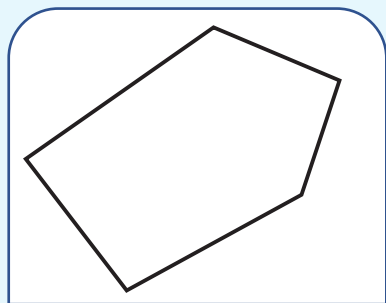


6.5.3 Wadarta Xaglo-gudeedyada Geesoole

Maadaama aynu horay u ogeyn in wadarta xaglaha gudaha ee saddexagal ay tahay 180° , waxa aan raadin karnaa wadarta xaglo-gudeedyada geesoole, annaga oo u eegayna inta saddexagal ee ku jirta geesoolayaha.

Waxqabadka 3aad

Bare, waydii ardayda in ay sheegaan inta saddexagal ee ku jirta shaxnada hoose:



Haddaba wadarta xaglogudeedka ee geesoole waxaa lagu helaa

$$(n - 2) \times 180^\circ$$

Halka n ay tahay tirada dhinacyada.

Tusaalaha 6aad: Bare, waydii ardayda in ay raadiyaan wadarta xaglo-gudeedyada siddeed-geesoole.

Furfuris

Maadaama siddeed-geesooluhu leeyahay 8gees iyo 8 dhinac

$$\begin{aligned}\therefore \text{wadarta xaglo-gudeedka} &= (n - 2) \times 180^\circ \\ &= (8 - 2) \times 180 \\ &= 6 \times 180^\circ \\ &= 1080^\circ\end{aligned}$$

Tusaalaha 7aad: Bare, waydii ardayda in ay raadiyaan qiimaha xaglo-gudeedyada 9-geesoole qaabsan.

Furfuris

Wadarta xaglo-gudeedka 9-geesoole = $(9 - 2) \times 180^\circ$

$$= 7 \times 180^\circ$$

$$= 1260^\circ$$

Qiimaha xagashii = $\frac{1260}{9} = 140^\circ$ (maaddaama uu qaabsanyahay)

Tusaalaha 8aad: Haddii wadarta xaglo gudeedyada geesoole qaabsan ay tahay 1440° , haddaba waa immisa tirada dhinacyad ee uu leeyahay geesooluhu? kadibna magacaw geesoolaha?

Furfuris

Wadarta xaglo-gudeedka = 1440°

$$(n - 2) \times 180 = 1440$$

$$n - 2 = \frac{1440}{180}$$

$$n - 2 = 8$$

$$n = 10$$

$\therefore$ geesooluhu waa 10 geesoole.

Waxqabadka 4aad

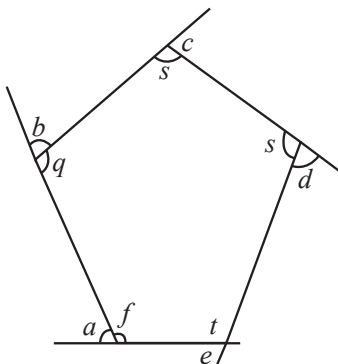
Shan xagal gudeed ee geesoole aan qaabsameyn ayaa middiiba tahay 110° . Haddaba, bare waydii ardayda in ay raadiyaan waxa aan raadinayaa xagasha 6aad.

6.5 .4 Wadarta Xaglo-dibadeedyada Geesoole

Waxqabadka 5aad

Waxa aan sawireynaa lixgeesle qaabsan kadibna waxa aan fidinaynaa dhinac kasta. Kadibna waxa aan cabbiraynaa xaglo-dibadeedyada, kadibna waxa aan raadinaynaa wadartooda.

Shaxanka hoose waxa uu ina tusayaa shangeesle qaabsan, $\angle b, \angle q, \angle r, \angle s$ iyo $\angle t$ waa xaglo gudeedyo halka $\angle a, \angle b, \angle c, \angle d$ iyo $\angle e$ ay yihiin xaglo dibadeedyo.



Wadarta xaglo dibadeedyada ee geesoole waa 360° .

Tusaalaha 9aad: Bare, waydii ardayda in ay raadiyaan qiimaha hal xagladibadeed ee 10 geesle qaabsan.

Furfuris

Wadarta xaglo-dibadeedyada geesoole = 360°

Wadarta 10 xagal dibadeed = 360°

$$\text{Xagashii} = \frac{360^\circ}{10} = 36^\circ$$

Tusaalaha 10aad: Haddii xagal-gudeed kasta ee geesoole qaabsan la'egtahay 135° ,
haddaba, bare, waydii ardayda in ay raadiyaan inta dhinac ee geesoolahaan leeyahay.

Furfuris

Xagal-gudeed kasta = 135° .

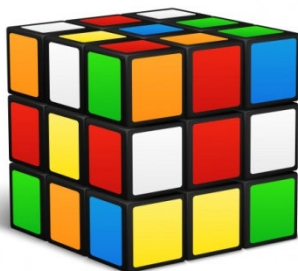
$\therefore$ xagal dibadeed kasta = $180^\circ - 135^\circ = 45^\circ$ (*∠daris ah*)

Wadarta xaglo-dibadeedyada = 360° .

Sidaas darteed tirada dhinacyada = $\frac{360^\circ}{45^\circ} = 8$

Layli

1. Raadi wadarta xaglo-gudeedyada ee geesoole leh:
b) 6 dhinac t) 9 dhinac
2. Imisa dhinac ayuu leeyahay geesoole ay wadarta xaglo gudeedyadiisu tahay:
b) 90° t) 360°
3. Immisa dhinac ayuu leeyahay geesoole qaabsan oo ay xagal ka mid ah xaglo-gudeedyadiisy tahay:
b) 99° t) 360°
4. Immisa dhinac ayuu leeyahay geesoole ay wadarta xaglo gudeedyadiisu tahay
b) 150° t) 144°
5. Raadi xagasha 5aad ee 5-geesoole iyadoo midkasta oo ka mid ah xagal ee kale ay tahay 110° .
6. Raadi qiimaha xagal dibadeed kasta ee:
b) 5-geesle qaabsan.
t) 12-geesle qaabsan.
j) Saddexagal qaabsan.
7. Haddii geesoole xaglo dibadeedkiisu kala yihiin $x^\circ, 2x^\circ, 3x^\circ, 4x^\circ$, iyo $5x^\circ$, haddaba raadi qiimaha x° .



Horudhac

Cabbiraaddu waa laan ka mid ah xisaabta taasoo lagu barto cabbiraadda dhererka, bedka, bed duleedka iyo mugga ee qaababka joometeriga. Heerkii 1aad waxa aynu kusoo barannay halbeegyada loo adeegsado dhererka, bedka iyo mugga iyo sidoo kale sida halbeegyadaas la isugu bedelo.

Cutubkaan waxa aan ku baran doonnaa sida loo cabbiro wareegga, bedka, bed duleedka iyo mugga walxo leh qaab joometeri.

Tusamada cutubka

Cutubkaan waxa aan ku baran doonnaa casharrada hoose:

1. Cabbiraadda wareegga iyo bedka laydi.
2. Cabbiraadda wareegga iyo bedka barbaroole iyo koor.
3. Cabbiraadda meeriska iyo bedka goobo.
4. Cabbiraadda bed duleedka dhululubo iyo sadjibeke.
5. Cabbiraadda mugga kubbad iyo toobin.

Ujeeddooyinka Cutubka

Dhammaadka cutubkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Cabbiraan wareegga iyo bedka laydi.
2. Cabbiraan wareegga iyo bedka barbaroole iyo koor.
3. Cabbiraan meeriska iyo bedka goobo.
4. Cabbiraan bed duleedka dhululubo iyo sadjibeke.
5. Cabbiraan mugga kubbad iyo toobin.
6. Furfuri karaan mas'alooyinka la xariira shaxannada kore.

7.1 Wareegga iyo Bedka Laydi, Barbarroole iyo Koor

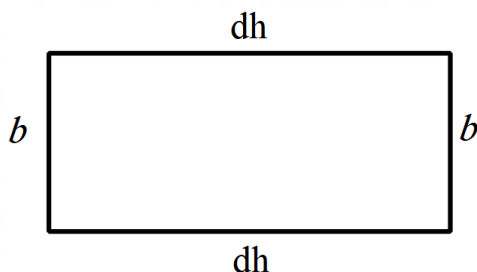
Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Heli karaan wareegga laydi, barbaroole iyo koor.
2. Heli karaan bedka laydi, barbaroole iyo koor.

7.1 .1 Wareegga iyo Bedka

Wareegga shaxan waa fogaanta ku oodan oogada shaxanka.

Wareegga waxaa halbeeg u ah mm , sm , m , km , i.w.m.



Haddaba, wareegga laydiga sare ee dhererkiisu yahay dh ballaciiisuna yahay b waa

$$wareeg = dh + b + dh + b$$

Waxaana loo soo ururin karaa:

$$Wareeg = 2dh + 2b$$

$$Wareeg = 2(dh + b)$$

Bedka shaxan waa xaddiga ku dahaaran oogada walaxda.

Bedka waxaa halbeeg u ah mm^2, sm^2, m^2, km^2 , i.w.m.

Bedka laydiga kore waxaa lagu helaa xeerka hoose:

$$B = dh \times j$$

Tusaalaha 1aad:

Bare, waydii ardayda in ay raadiyaan ballaca laydi bedkiisu yahay $200sm^2$, dhererkiisuna yahay $25sm$.

Furfuris:

$$B = 200 sm^2, dh = 25sm, b = ?$$

$$B = d h b$$

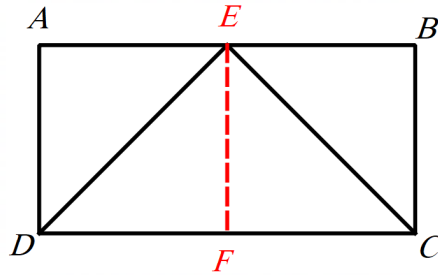
$$200sm^2 = (25sm)b$$

$$b = \frac{200sm^2}{25sm}$$

$$b = 8 sm$$

Bedka Saddexgal:

Laydiga hoose ee $ABCD$ waxa ku dhexjira saddexagalka CDE



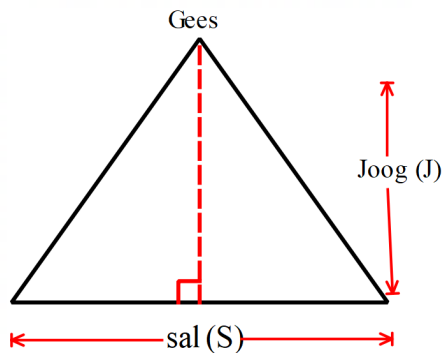
Barta E waa gees kamid ah geesaha $\triangle CDE$, EF waa joogga $\triangle CDE$, CD waa dhererka laydiga balse imminka waa salka $\triangle CDE$.

Sidoo kale $\triangle DEF$ waa kalabarka laydiga $AEFD$.

$\triangle CEF$ waa kalabarka laydiga $EBCF$.

Bedka laydiga $ABCD$ = bedka laydiga $AEFD$ + bedka laydiga $EBCF$.

Haddaba, *bedka* $\triangle CDE$ waa kalabarka bedka $ABCD$.



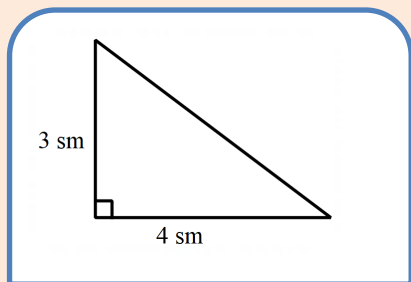
Bedka Saddex Xagalka waa:

$$B = \frac{1}{2}sj$$

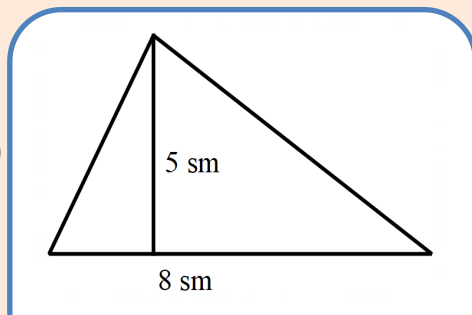
Layli

1. Raadi bedadka shaxannada hoose:

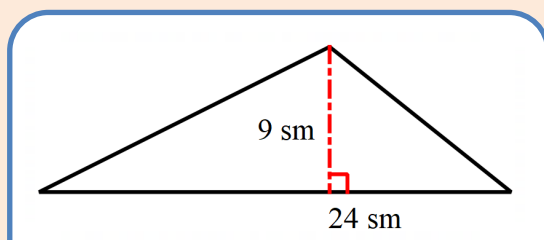
b)



t)

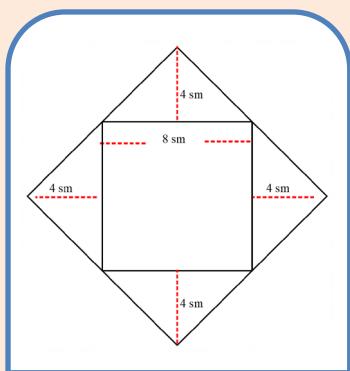


j)

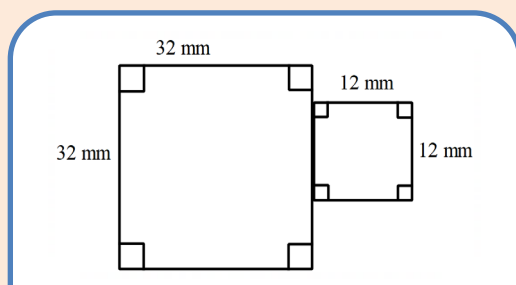


2. Raadi Bedadka shaxannada hoose:

b)



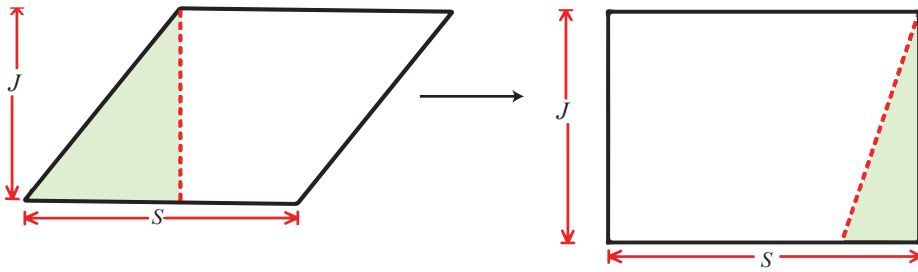
t)



7.1 .2 Bedka Barbarroole iyo Koor

B. Bedka Barbarroole

Barbarroole waxaa loo qaabayn karaa qaabka laydiga sida ka muuqata shaxanka hoose:



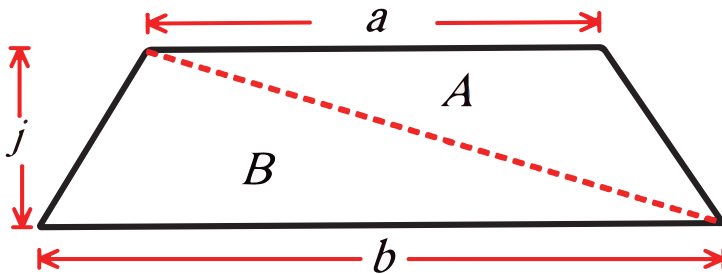
Haddaba, bedka barbarroole waxaa lagu helaa:

$$B = \text{dhererka salka} \times \text{Joogga ku qotoma}$$

$$B = dhj$$

Bedka Koor

Koor waa shaxan loo kala qeybin karo laba saddexagal, sida:



$$\text{Bedka } \Delta A = \frac{1}{2} \times a \times j$$

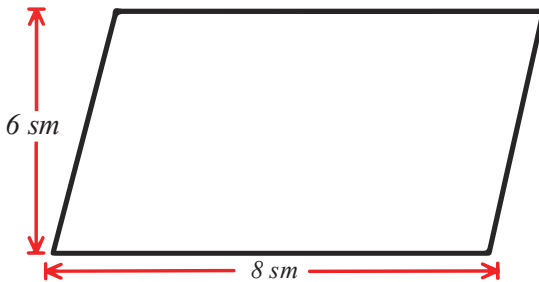
$$\text{Bedka } \Delta B = \frac{1}{2} \times b \times j$$

$$\text{Bedka koorta} = \text{Bedka } \Delta A + \text{Bedka } \Delta B$$

$$= \frac{1}{2}aj + \frac{1}{2}bj$$

$$B = \frac{1}{2}j(a + b)$$

Tusaalaha 1aad: Bare, waydii ardayda in ay raadiyaan bedka barbarroolaha hoose:



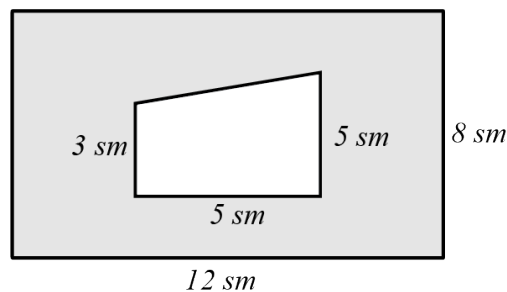
Furfuris:

$$B = sj$$

$$= 8sm \times 6sm$$

$$= 48sm^2$$

Tusaalaha 2aad: Bare, waydii ardayda in ay raadiyaan bedka shaxanka hoose inta la midabeeyay. Dhererka laydiga waa 12sm ballaciisuna waa 8sm.



Furfuris:

Bedka laydiga

$$B = 8sm \times 12sm$$

$$= 96sm^2$$

$$\text{Bedka koorta} = \frac{1}{2} \times 5(3 + 5)$$

$$= 2.5 \times 8$$

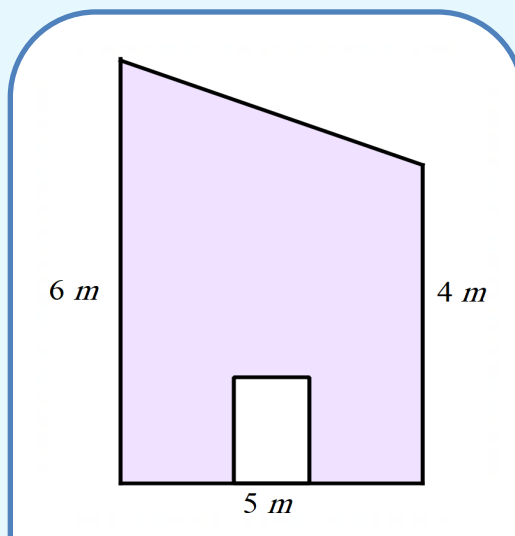
$$= 20 sm^2$$

$$\text{Bedka shaxanka midabaysan} = 96 sm^2 - 20sm^2$$

$$= 76sm^2$$

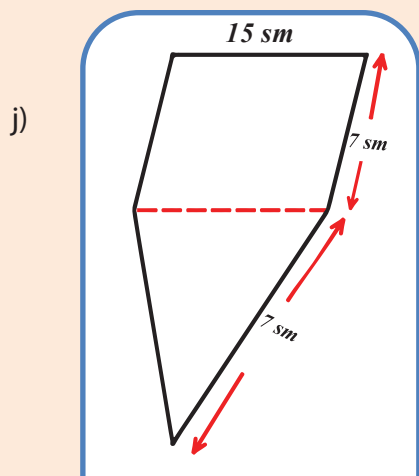
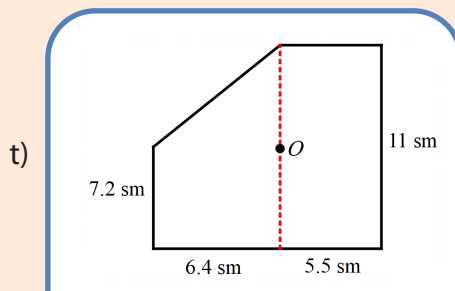
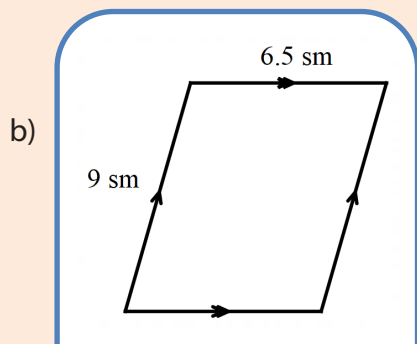
Waxqabadka 1aad

Shaxanka hoose waxa uu ina tusayaa wajiga hore ee guri. Haddaba, haddii ballaca albaabka iyo joogga cabbirkoodu kala yahay $0.75 m$ iyo $2 m$ waxa aan raadinaynaa bedka inta midabaysan.

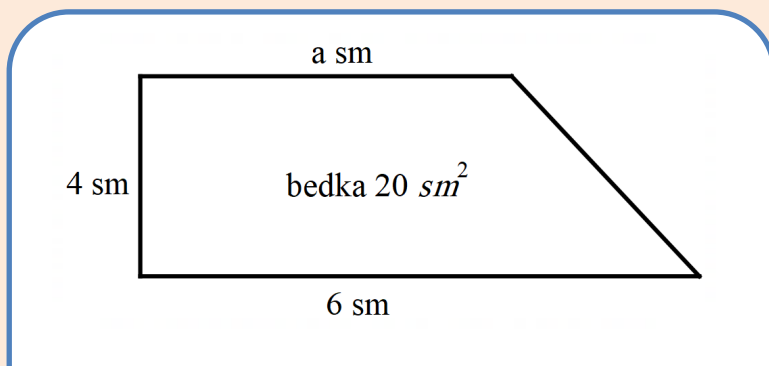


Layli

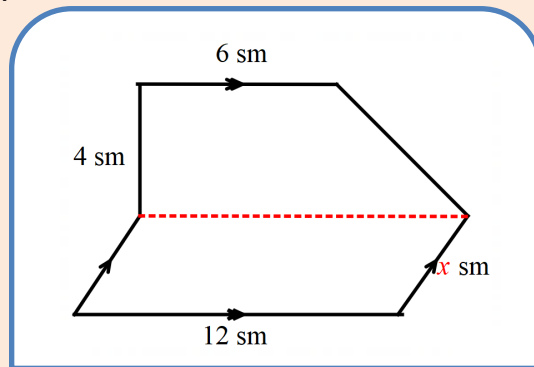
1. Raadi bedka shaxannada hoose:



2. Raadi qiimaha a .



3. Haddii bedka koorta iyo barbaroolaha ay isla'egyihin, raadi qiimaha x .



7.2 Meeriska iyo Bedka Goobo

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Heli karaan meeriska goobo.
2. Heli karaan bedka goobo.

Waxqabadka 1aad

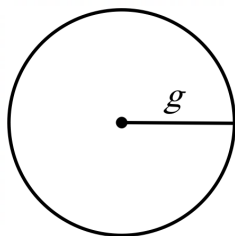
Waxa aan adeegsanaynaa dun si aan u cabbirno meeriska iyo bedka walax leh qaab goobo.

Goobadu waxaa sameeya baro isku xiran oo isku fogaan u wada jira bar cayiman oo la yiraahdo xuddunta goobada.

Fogaankasta oo u dhaxaysa barta xuddunta iyo baraha goobada waxaa la yiraahdaa gacanka goobada.

Xariiq kasta oo mara xuddunta islamarkaana u kala bara goobada laba qeyb oo siman waxaa loo yaqaanaa dhexroor.

Bal eeg shaxanka hoose:



Meeriska = $2\pi g$ Bedka = πg^2 , halka g = gacanka goobada.

Waxqabadka 2aad

Waxa aan raadinaynaa annaga oo adeegsanayno dun iyo goobo qiimaha π .

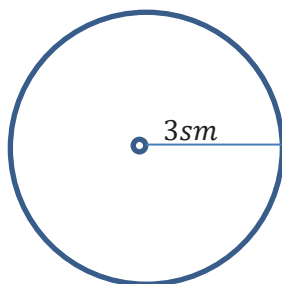
Waxqabadka 3aad

Waxa aan baaraynaa xiriirka ka dhaxeeya gacanka goobada iyo dhexroorka

Waxqabadka 4aad

Haddii gacanka taayar gaari uu yahay $25sm$ waxa aan raadinaynaa fogaan intee la'eg ayaa lugta gaarigu jari kartaa halkii wareeg. Sidoo kale haddii safar dhan $1km$ lasocday waxa aan helaynaa inta jeer ee ay lugtu wareegatey.

Tusaalaha 1aad: Waxa aan raadinaynaa meeriska goobada hoose.



Furfuris

$$\begin{aligned}\text{Meeriska} &= 2\pi r \\ &= 2\pi \times 3 = 18.8sm, [\pi = 3.142]\end{aligned}$$

Tusaalaha 2aad: Waxa aan raadinaynaa gacanka goobo uu meeriskeedu yahay $12sm$.

Furfuris

$$\text{Meeris} = 2\pi g$$

$$g = \frac{\text{meeris}}{2\pi}$$

$$= \frac{12}{2\pi} = 1.91sm$$

Tusaalaha 3aad: Haddii bedka goobo yahay $34sm^2$, waxa aan raadinaynaa gacanka goobada.

Furfuris

$$B = \pi g^2$$

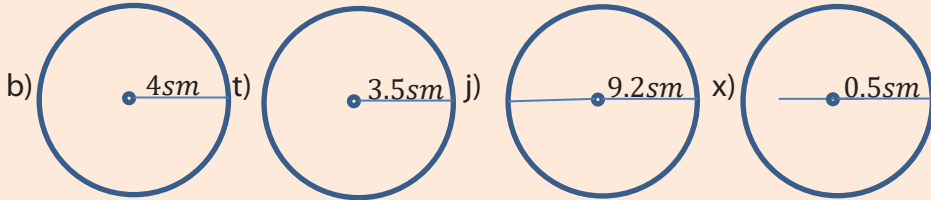
$$g^2 = \frac{B}{\pi}$$

$$g = \sqrt{\frac{34}{\pi}}$$

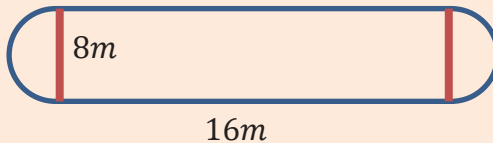
$$g = 3.29sm$$

Layli

1. Raadi meeriska goobo kasta ee soo socota (u qaado $\pi = 3.142$)



2. Raadi bedka – goobo kasta ee ku sawiran su'aasha 1aad.
3. Raadi gacanka goobo haddii meerisku yahay:
- b) 15sm t) π sm j) 4m x) 8mm
4. Raadi dhexroorka goobo haddii bedkeedu yahay:
- b) 16sm^2 t) $9\pi \text{sm}^2$ j) 8.2sm^2 x) 14.6mm^2
5. Jardiin ayaa waxaa loo dhisay qaab laydi iyo nus goobo, sida ka muuqata shaxanka hoose. Haddaba, raadi wareegga jardiinka. Sidoo kale raadi bedkiisa.



7.3 Bed Duleedka Dhululubo Iyo Sadjibeka

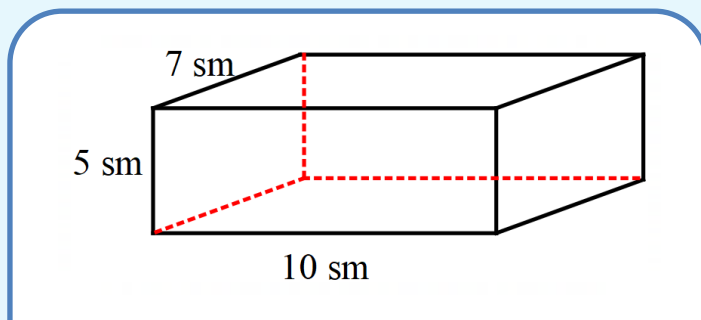
Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Heli karaan bed-duleedka dhululubo.
2. Heli karaan bed-duleedka sadjibeke.

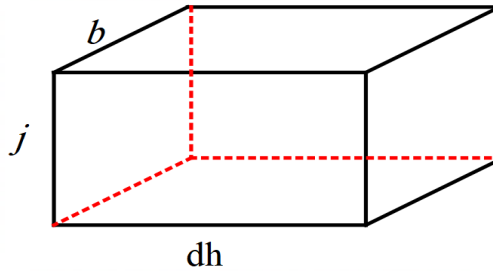
Marka aynu dooneyno in aynu helno bed-duleedka sadjibeka, marka hore waxa aynu eegaynaa wajiyadiisa. Haddaba wajiyadu waxa ay noqon karaan labajibaare ama laydi mid kood. Sidaa darteed bed-duleelka sadjibekuhu waxa uu u noqonayaa wadarta bedadka wajiyadiisa.

Waxqabadka 1aad

Waxa aan raadinaynaa bed duleedka sadjibekeha hoose.



Haddaba bed-duleedka sadjibekeha hoose waxaa lagu heli karaa sidan, soo socoto:



$$\text{Bedka sare} = d h b$$

$$\text{Bedka hoose} = d h b$$

$$\text{Bedka hore} = d h j$$

$$\text{Bedka danbe} = d h j$$

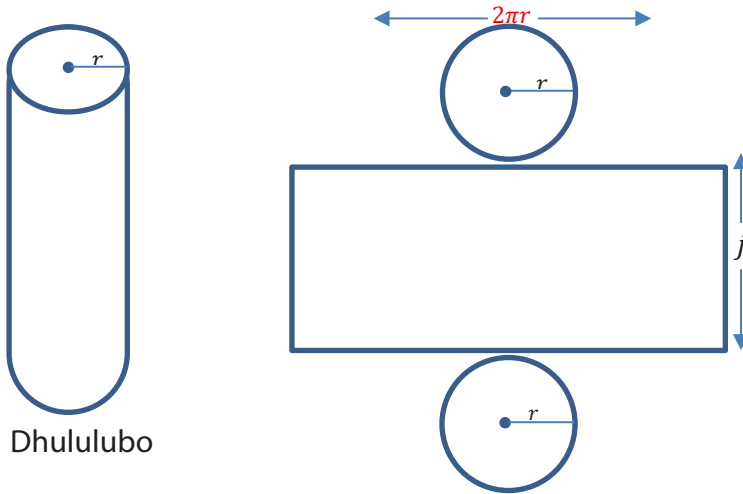
$$\text{Bedka dhinac} = b j$$

$$\text{Bedka dhinaca kale} = b j$$

$$\begin{aligned} \text{Wadarta bedadka} &= d h b + d h b + d h j + d h j + b j + b j \\ &= 2 d h b + 2 d h j + 2 b j \\ &= 2(d h b + d h j + b j) \end{aligned}$$

Bed-duleedka dhululubo

Bed-duleedka dhululubo si aan u helno waxa aynu eegaynaa shaxanka hoose kaasoo ka kooban labo goobo iyo hal laydi.



Dhululubo

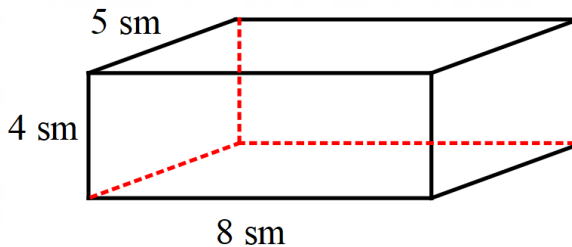
$$\text{Bedka labada goobo} = 2 \times \pi g^2$$

$$\text{Bedka laydiga} = 2\pi g \times j$$

$$\text{Wadarta bed duleedyada} = 2\pi g^2 + 2\pi g j$$

$$\therefore \text{bed-duleedka dhululubo} = 2\pi g(g + j)$$

Tusaalaha 1aad: Waxa aan raadinaynaa bed-duleedka sadjibekeha hoose.



Furfuris

$$\text{Bedadka kor iyo hoos} = 2 \times 5 \times 8 = 80sm^2$$

$$\text{Bedadka horay iyo gadaal} = 2 \times 4 \times 8 = 64sm^2$$

$$\text{Bedadka labada dhinac} = 2 \times 4 \times 5 = 40sm^2$$

$$\therefore \text{bed-duleedka sadjibekuhu} = 80sm^2 + 64sm^2 + 40sm^2 = 184sm^2$$

aynu

Tusaalaha 2aad: Haddii joogga dhulubo yahay $7sm$ gacanka goobadiisa sarena tahay $3sm$, haddaba raadino bed-duleedka dhululubada.

Furfuris

$$\text{Bed-duleed dhululubo} = 2\pi g (g + j)$$

$$= 2\pi \times 3 \times (3 + 7)$$

$$= 6\pi \times 10$$

$$= 60\pi$$

$$= 188sm^2$$

Layli

1. Raadi bed-duleedka sadjibeke haddii;

b) $dh = 12sm$, $b = 10sm$, $j = 5sm$

t) $dh = 4sm$, $b = 6sm$, $j = 8sm$

j) $dh = 4.2sm$, $b = 7.1sm$, $j = 3.9sm$

2. Raadi joogga sadjibeke haddii:

b) $dh = 5sm$, $b = 6sm$, $B = 104sm^2$

t) $dh = 2sm$, $b = 8sm$, $B = 112sm^2$

j) $dh = 3.5sm$, $b = 4sm$, $B = 118sm^2$

3. Raadi bed-duleedka dhulubada:

b) $g = 2sm$, $j = 6sm$

t) $g = 4sm$, $j = 7sm$

j) $g = 3.5sm$, $j = 9.2sm$

x) $g = 0.8sm$, $j = 4.3sm$

4. Raadi joogga dhululubo haddii dhululubo:

b) $g = 2sm$, $B = 40sm^2$

t) $g = 3.5sm$, $B = 88sm^2$

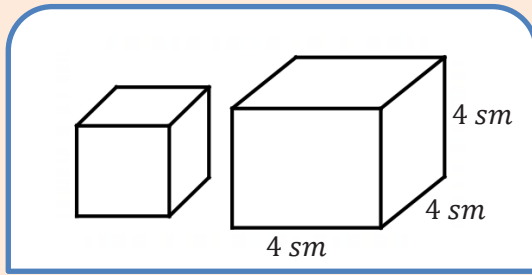
j) $g = 5.5sm$, $B = 250sm^2$

x) $g = 3sm$, $B = 189sm^2$

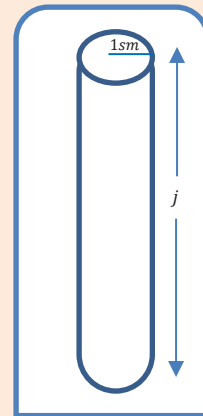
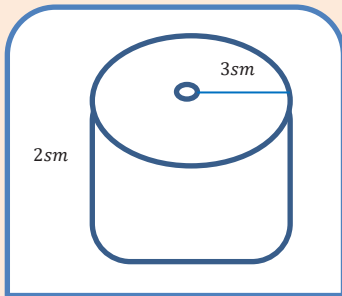
5. Laba saddex-jibbaarane ayaa is dhinac yaalla.

Dhinac kasta ee saddex-jibbaaranaha weyn ayaa ah $4sm$.

Saamigooduna waa 1:4. Haddaba raadi bed-duleedka saddex-jibbaaranaha yar iyo dhinaciisa.



6. Raadi bed-duleedka mid ka mid ah labada dhululubo iyo joogga dhululubada dheer.



7.4 Bed-Duleedka Kubbad

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Heli karaan bed-duleedka kubbad.
2. Furfuri karaan mas'alooyinka la xariira bed duleedka kubbad.

Waxqabadka 1aad

Waxa aan soo qaadanaynaa kubbad dhexroorkeedu yahay 10sm, ka dibna waxa aan dhex dhigayaa kartoona la'eg, kadibna waxa aan raadinaynaa mugga kubadda iyo kartoona.

Mugga kubbad waxaa lagu helaa xeerka hoose:

$$\text{Mug} = \frac{4}{3}\pi g^3$$

$$\text{Bed} = 4\pi g^2$$



Tusaalaha 1aad: Waxa aan raadinayanaa mugga kubbad gacankeedu yahay 3sm.

Furfuris

$$\text{Mugg} = \frac{4}{3}\pi g^3$$

$$= \frac{4}{3} \times \pi \times 3^3$$

$$= 113.1\text{sm}^3$$

Tusaalaha 2aad: Haddii mugga kubbad uu yahay 150sm^3 , haddaba raadi gacanka kubadda.

Furfuris

$$\text{Mug} = \frac{4}{3}\pi g^3$$

$$g^3 = \frac{3\text{mug}}{4\pi}$$

$$= \frac{3 \times 150}{4\pi}$$

$$g^3 = 35.8$$

$$g = \sqrt[3]{35.8}$$

$$= 3.30\text{sm}$$

Layli

- 1) Raadi mugga kubad haddii gacankeedu yahay:
a. $g = 6\text{sm}$ b. $g = 9.5\text{sm}$ c. $g = 8.2\text{sm}$ d. $g = 0.7\text{sm}$
- 2) Ku sheeg gacanka kubbad sentimitir ahaan haddii muggu yahay:
b) 130sm^3 t) 720sm^3 j) 0.2m^3 x) 1000mm^3
- 3) Raadi bed-duleedka kubbadda gacankeedu yahay:
b) $g = 6\text{sm}$ t) $g = 4.5\text{sm}$ j) $g = 12.25\text{sm}$

7.5 Mugga Toobin

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

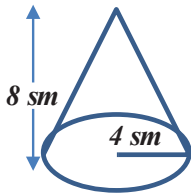
1. Heli karaan mugga toobin.

Toobin waa shaxan leh qaabka haramka salkiisuna yahay goobo.

Xeerka lagu heli karo muggiisa waa:

$$\text{Mug} = \frac{1}{3} \times \text{bedka salka} \times \text{joog} = \frac{1}{3} \times \pi g^2 j$$

Tusaalaha 1aad: Raadi mugga toobinta



Furfuris

$$\begin{aligned}\text{Mug} &= \frac{1}{3} \pi g^2 j \\ &= \frac{1}{3} \times \pi \times (4\text{sm})^2 \times 8\text{sm} \\ &= 134\text{sm}^3\end{aligned}$$

Tusaalaha 2aad: Raadi gacanka salka toobin haddii muggeedu yahay 314m^3 , jooggeeduna yahay 12m . $\pi = 3.14$

Furfuris

$$\begin{aligned}\text{Mug} &= \frac{1}{3} \pi g^2 j \\ g^2 &= \frac{3 \times \text{mug}}{\pi j} \\ g^2 &= \frac{3 \times 7314}{3.14 \times 12} = 25 \\ g &= \sqrt{25} = 5\text{m}\end{aligned}$$

Layli

1) Raadi mugga toobin haddii:

b) $g = 3sm$, $j = 6sm$

t) $g = 6sm$, $j = 7sm$

j) $g = 8mm$, $j = 2sm$

x) $g = 6sm$, $j = 44mm$

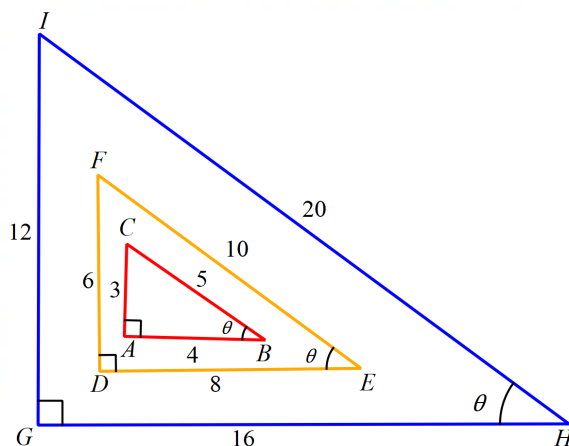
2) Raadi gacanka toobin haddii:

b) Mugga = $600sm^3$, $j = 12sm$

t) Mugga = $225sm^3$, $j = 18mm$

j) Mugga = $1400mm^3$, $j = 2sm$

Cutubka 8aad: Tirignoometeri



Horudhac

Ereyga tirignoometeri wuxuu ka yimid afka Giriigga waxa uuna ka kooban yahay laba eray oo kala ah tirigoon oo ah sadexagal iyo meteri oo ah cabbiraad. Waagii hore cilmigaan waxaa loo adeegsan jiray cilmiga xiddigaha iyo badmaaxnimada, haseyeeshee hadda meelo badan ayaa loo adeegsadaa.

Tirignoometerigu waa laan ka mid ah cilmiga xisaabta oo lagu isticmaalo furfurista saddexagallada. Habkasta oo loo raaco furfurista cilmigaanna lix saami ayaa ka dhasha, haseyeeshee cutubkaan waxa aan ku baran doonnaa saddexda saami ee ugu horeysa.

Tusmada Cutubka

Cutubkaan waxa aan ku baran doonnaa casharada hoose:

1. Aragtiinka Baysogras.
2. Saamiyada tirignoometeriga.
3. Xiriirka ka dhaxeeya saamiyada tirignoometeriga

Ujeedooyinka Cutubka

Dhammaadka cutubkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

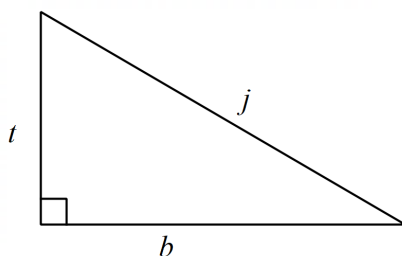
1. Adeegsadaan aragtiinka Baysogras.
2. Heli karaan dhinaca maqan ee saddexagal qumman.
3. Gartaan xiriirka ka dhaxeeya dhinacyada saddexagalka qumman.
4. Heli karaan qiimaha saamiyada tirignoometeriga.

8.1 Aragtiinka Baysogras

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Adeegsan karaan aragtiinka baysogras.
2. Heli karaan dhinaca maqan ee saddexagal qumman.

Waxa aan eegaynaa saddaxagalka hoose oo ay dhainacyadiisu kala yihiin b , t iyo j . Dhinaca ugu dheer, j , waxa uu kasoo horjeedaa xagasha qumman waxaana loo yaqaan **shakaal**.



Waxqabadka 1aad

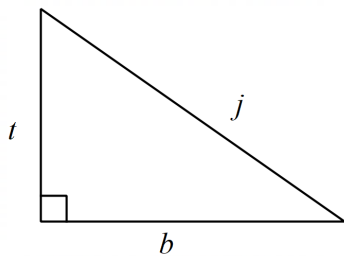
Waxa aan sheegaynaa xiriirka u dhaxeeya dhinacyada saddexagalka qumman.

Haddaba, xisaabyahankii la oran jiray Baysogras ayaa shaaca ka qaaday aragtiinka hoose:

“Saddexagalkasta ee qumman, wadarta laba jibbaarada labadiisa dhinac ee isku qotoma waxa ay la’egtahay laba jibbaarka shakaalkiise”

Waxqabadka 2aad

Waxa aan caddeynaynaa in wadarta laba jibbaarrada ee dhinacyada isku qotoma ee saddexagal qumman ay la’egtahay laba jibbaarka shakaalka.



$$b^2 + t^2 = j^2$$

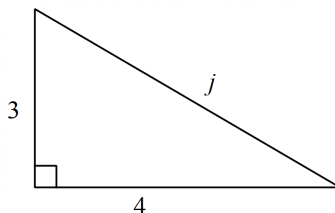
$j = \text{shakaal}$

$b, t = \text{labada dhinac ee isku qotoma.}$

8.1 .1 Raadinta dhinac ka mid ah saddexagal qumman

Haddii aan haysanno laba dhinac ee ka mid ah saddexagal qumman waxa aan heli karnaa dhinaca maqan annaga oo adeegsanayna Aragtiinka Baysogras.

Tusaalaha 1aad: Waxa aan raadinaynaa shakaalka saddexagalka hoose:



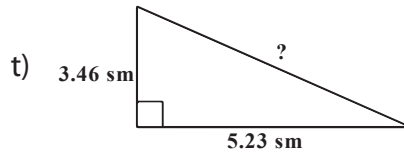
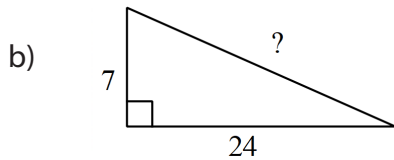
Furfuris:

$$j^2 = a^2 + b^2$$

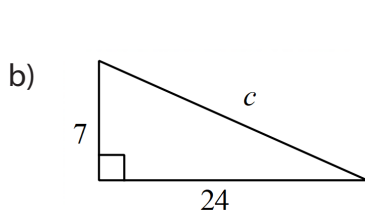
$$j^2 = 3^2 + 4^2$$

Haddaba $j = 5$

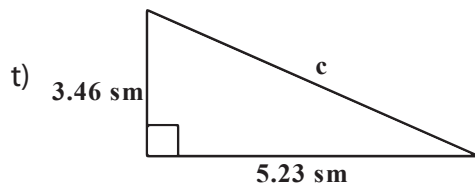
Tusaalaha 2aad: Waxa aan raadinaynaa dhinaca maqan ee soo socda:



Furfuris:

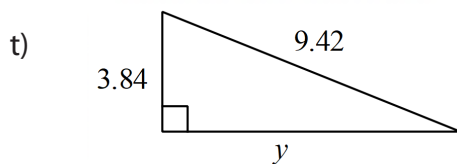
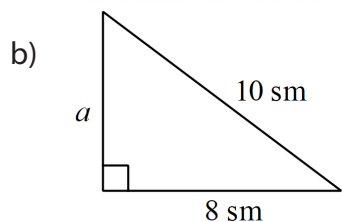


$$\begin{aligned}j^2 &= b^2 + t^2 \\&= 7^2 + 24^2 \\&= 625 \\j &= \sqrt{625} \\&= 25\end{aligned}$$



$$\begin{aligned}j^2 &= 3.46^2 + 5.23^2 \\j^2 &= 40.6025 \\j^2 &= \sqrt{40.6025} \\j &= 6.37\end{aligned}$$

Tusaalaha 3aad: Waxa aan raadinaynaa dhinaca maqan ee saddexagallada qumman ee soo socda.



Furfuris:

$$\text{b) } a^2 + 8^2 = 10^2$$

$$a^2 + 64 = 100$$

$$a^2 = 100 - 64$$

$$a^2 = 36$$

$$a = \sqrt{36}$$

$$a = 6$$

$$\text{t) } 3.84^2 + y^2 = 9.42^2$$

$$y^2 = 9.42^2 - 3.84^2$$

$$y^2 = 73.9908$$

$$y = \sqrt{73.9908}$$

$$y = 8.60$$

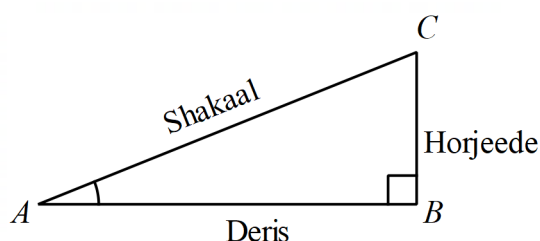
8.2 Saamiyada Tirignometeriga

Dhammaadka casharkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Gartaan saamiyada tirignometeri.
2. Raadin karaan qiimaha tirignometeri.

Waxa aan ku baranaynaa casharkaan saddex saami, oo kala ah Taanjant (tan), sayn (sin) iyo kosayn (cos). Saamiyadaan waxaa loo yaqaannaa Haddaba haddii saamiyadaas lagu dabbaqo saddaxagallada qumman, waxa ay sameeyaan xiriir ka dhaxeeya dhinacyada saddaxagalka qumman iyo xaglahiisa.

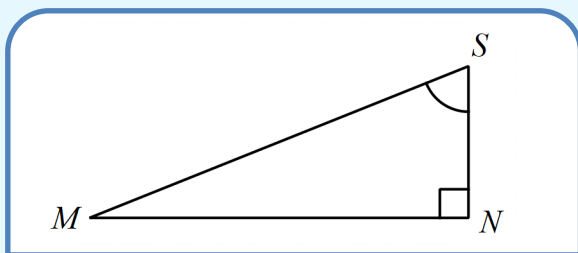
Saddex xagalka hoose $\triangle ABC$, dhinaca AC waa shakaalka, dhinacyada kale waxaa la magacaabaa iyada oo loo eegayo hadba xagasha la summadeeyay (sida tan hadda la summadeeyay waa $\angle A$). Dhinaca AB oo ku xiga $\angle A$ waxaa layiraahdaa dhinac deris ah, halka BC oo ka soo horjeeda $\angle A$ loo yaqaan horjeede.



Waxqabadka 1aad

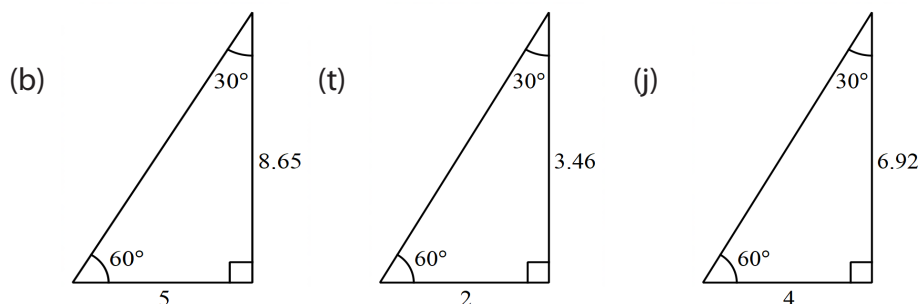
Saddexagalka hoose waa saddexagal qumman, waxa uuna ka summadaysan yahay xagasha S.

Haddaba, waxa aan ku dul muujinaynaa dhinac kasta magaca loo yaqaanno.



8.2 .1 Saamiga Taanjant

Bal u fiirso saddexda xagal qumman ee hoose waxa ay wada leeyihiin xaglo cabbirkoodu yahay 90° , 60° , iyo 30° . Dhinacyadooduna waa ay kala duwan yihiin.



Haddii aan u fiirsanno keliya xagasha 60° , dhinaca kasoo horjeeda xagasha qumman, wa shakaalki, dhinaca ku xiga xagasha 60° waxaa la yiraahdaa deris, dhinaca saddexaadna wa horjeede.

Haddaba, haddii aan eegno xagasha 60° ee saddexagallada kore waxa aan helaynaa in:

$$b) \frac{\text{Horjeede}}{\text{Deris}} = \frac{8.65}{5} = 1.73$$

$$t) \frac{\text{Horjeede}}{\text{Deris}} = \frac{3.46}{2} = 1.73$$

$$j) \frac{\text{Horjeede}}{\text{Deris}} = \frac{6.92}{4} = 1.73$$

Waxa aan aragnaa in saddexda saami ay isla'egyahiin. Waxaana sidaas oo kale yeelan kara saddexagal qumman kasta oo leh cabbiraadda 90° , 60° iyo 30° .

Haddaba, qiimahaas sugan ayaa waxaa layiraahdaa taanjantiga 60° ($\tan 60^\circ$) Waxaana u qoraynaa sidatan.

$$\tan 60^\circ = 1.73$$

Haddaba, taanjantiga xagasha A waa:

$$= \frac{\text{Dhererka Horjeedaha Xagasha } A}{\text{Dhererka Deriska Xagasha } A}$$

$$\therefore \tan A = \frac{\text{Horjeede}}{\text{Deris}}$$

Waxqabadka 2aad

Waxa aan sawiraynaa $\triangle ABC$, halka $AB = 7\text{sm}$, $\angle A = 35^\circ$ $\angle B = 90^\circ$, kadibna waxa aan helaynaa BC . Sidoo kale qiimaha $\tan 35^\circ$.

Tusaalaha 1aad: Waxa aan adeegsanaynaa kalkulaytarka si aad u xisaabiso qiimaha $\tan 35^\circ$.

Furfuris

Guji: $\tan 35^\circ =$

Shaashadda:

Waxqabadka 3aad

Waxa aan adeegsanaynaa kalkulatoryarka si aan u helo $\tan 70^\circ$.

Tusaalaha 2aad: Waxa aan adeegsanaynaa kalkulatoryarka si aan u helno xagasha x haddii $\tan x = 0.36$

Furfuris:

$$\tan x = 0.36$$

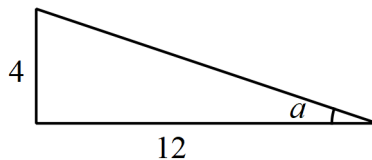
$$x = \tan^{-1}(0.36)$$

Guji: shift tan 0 . 3 6 =

Shaashadda: 19.79887635

$$x = 19.8^\circ$$

Tusaalaha 3aad: Waxa aan raadinaynaa qiimaha xagasha a ee shaxanka hoose:



Furfuris:

$$\tan a = \frac{4}{12}$$

$$a = \tan^{-1}\left(\frac{4}{12}\right)$$

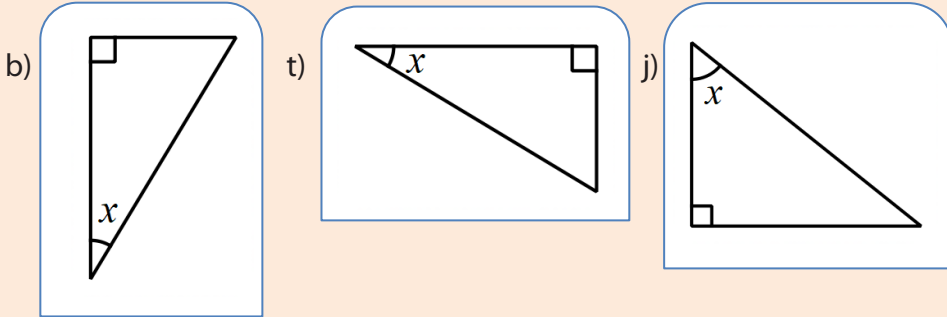
Guji: shift tan (4 ÷ 1 2) =

Shaashadda: 18.43494882

$$\therefore a = 18.4^\circ$$

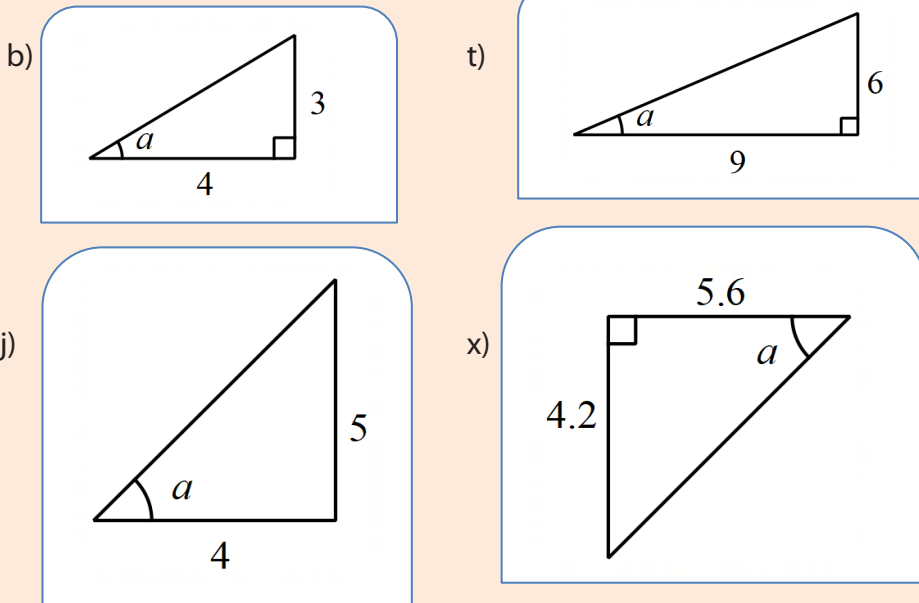
Layli

1. Magacaaw dhinacyada adiga oo eegaya xagasha x .



2. Sawir $\triangle ABC$, haddii $AB = 10 \text{ sm}$, $\angle A = 20^\circ$, $\angle B = 90^\circ$, kadibna cabbir BC , sidoo kale hel taanjantiga $\angle A$.

3. Raadi qiimaha $\tan a$.



4) Adeegso kalkulaytar si aad u hesho:

b) $\tan 40^\circ$

t) $\tan 23^\circ$

j) $\tan 35^\circ$

x) $\tan 85.1^\circ$

kh) $\tan 12.6^\circ$

d) $\tan 0^\circ$

5) Adeegso kalkulaytarka si aad u hesho qiimaha xagasha a :

b) $\tan a = 12$

t) $\tan a = 4.2$

j) $\tan a = 0.0012$

x) $\tan a = 0$

kh) $\tan a = 4.37$

d) $\tan a = 200$

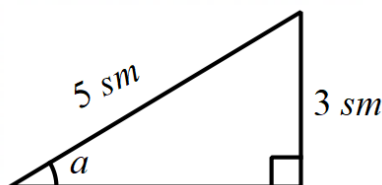
8.2 .2 Saamiga Sayn

Saamiga taanjanti waxaa la adeegsadaa marka aan heysano labo dhinac oo isku qotoma ee saddexagalka qumman. Haddii aysan sidaa dhicin waa ay adagtahay in aad adeegsado saamiga taanjanta.

Hadaba,

$$\text{Saynka xagasha } A = \frac{\text{Dhereka dhinaca horjeedaha } \angle A}{\text{Dhererka dhinaca shakaalka}}$$
$$\text{saynka } A = \frac{\text{horjeede}}{\text{shakaal}}$$

Tusaalaha 1aad: Annaga oo adeegsanayna saddexagalka qumman ee hoose waxa aan raadinaynaa sayn(a) (sina).



Furfuris

$$\begin{aligned}\sin a &= \frac{\text{horjeede}}{\text{shakaal}} \\ &= \frac{3}{5} \\ &= 0.6\end{aligned}$$

Tusaalaha 2aad: Annaga oo adeegsanayno kalkulaytar waxa aan raadinaynaa $\sin 70^\circ$

Furfuris

Guji

Guji

Shaashadda:

$$\therefore \sin 70^\circ = 0.940$$

Tusaalaha 3aad: Waxa aan raadinaynaa xagasha x , haddii $\sin x = 0.753$

Furfuris

Sayn $x = 0.753$

$$x = \sin^{-1}(0.753)$$

Guji = shift Sin (0 . 7 5 3)

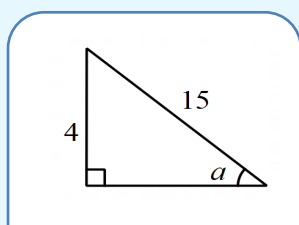
Guji =

Shaashadda: 48.8509197

$$\therefore \angle x = 48.9^\circ$$

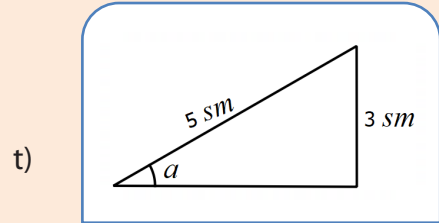
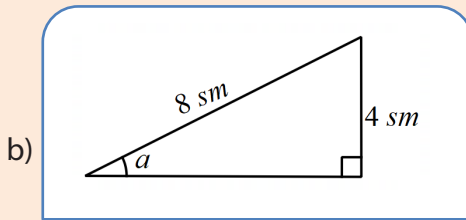
Waxqabadka 4aad

Waxa aan helaynaa xagasha a ee saddexagalka hoose.



Layli

1. Sawir $\triangle ABC$ haddii $AC = 10\text{sm}$, $\angle A = 20^\circ$, $\angle B = 90^\circ$, misana raadi sayn A.
2. Raadi $\sin a$.



3. Raadi qiimaha (adeegso aaladda xisaabinta)

b) $\sin 30^\circ$

t) $\sin 45^\circ$

j) $\sin 90^\circ$

x) $\sin 12.1^\circ$

kh) $\sin 76.2^\circ$

d) $\sin 57^\circ$

4. Raadi xagasha a haddii,

b) $\sin a = 0.3$

t) $\sin a = 0.456$

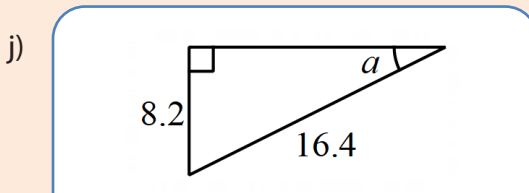
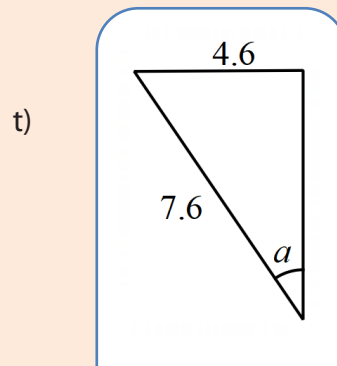
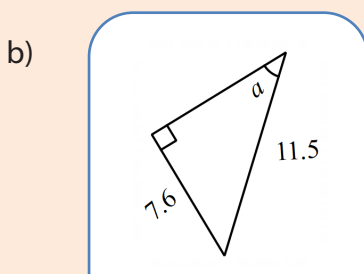
j) $\sin a = 1$

x) $\sin a = 0.78$

kh) $\sin a = 0.01$

kh) $\sin a = 0.84$

5. Raadi xagasha a .



8.2 .3 Saamiga Kosayn

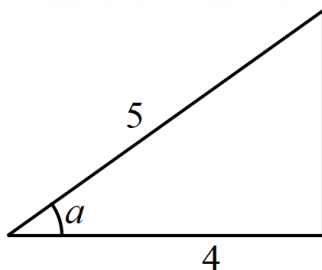
Kosayn waa saamiga saddexaad ee saamiyada tirignoometari waxaana la adeegsadaa marka lagu siiyo shakaalka iyo deriska ee xagal.

Haddaba.

$$\text{Koosaynka xagasha } A = \frac{\text{dhereka deriska } \angle A}{\text{dhererka shakaalka}}$$

$$\text{Koosayn } A = \frac{\text{Deris}}{\text{shakaal}} \text{ ama } \cos A = \frac{\text{Deris}}{\text{shakaal}}$$

Tusaalaha 1aad: Waxa aan raadinaynaa koosayn a ee shaxanka hoose.



Furfuris

$$\begin{aligned}\cos a &= \frac{\text{Deris}}{\text{shakaal}} \\ &= \frac{4}{5} \\ &= 0.8\end{aligned}$$

Tusaalaha 2aad: Waxa aan raadinaynaa $\cos 70^\circ$ annaga oo isticmaaleyno kalkulaytarka.

Furfuris

Guji:

cos	7	0	=
-----	---	---	---

Shaashada

0.342020143

$$\therefore \cos 70 = 0.342$$

Tusaalaha 2aad: Waxa aan raadinaynaa xagasha x $\cos x = 0.135$

Furfuris

$$\cos x = 0.135$$

$$x = \cos^{-1}(0.135)$$

Guji:

shift	cos	(0	.	1	3	5)	=
-------	-----	----	---	---	---	----	---

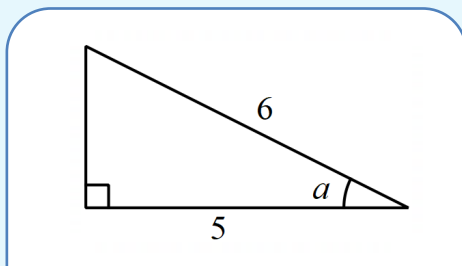
Shaashada

82.2413801

$$\therefore \angle x = 82.2^\circ$$

Waxqabadka 5aad

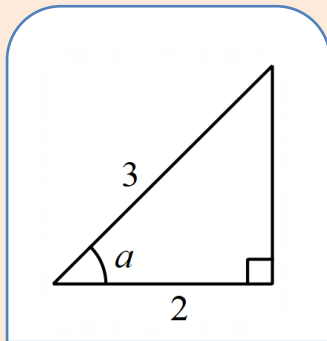
Waxa aan helaynaa xagasha a ee shaxanka hoose.



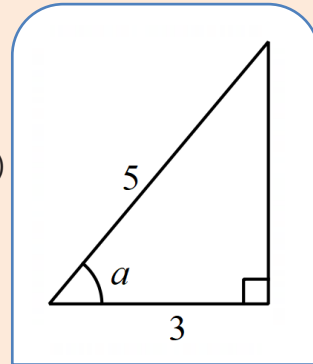
Layli

- 1) Sawir islamrkaana hel $\cos A$ ee $\triangle ABC$, haddii $AB = 8$,
 $\angle A = 30^\circ$, $\angle B = 90^\circ$.
- 2) Raadi $\cos a$.

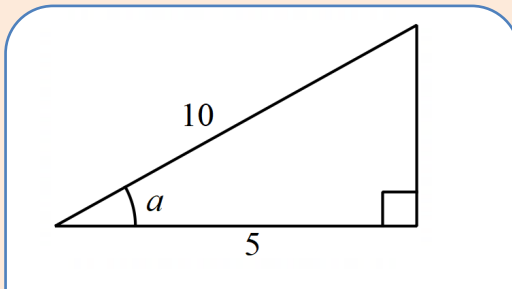
b)



t)



j)



- 3) Raadi qiimaha adiga oo adeesanaya kalkulatarka.

b) $\cos 0^\circ$

t) $\cos 60^\circ$

j) $\cos 24.5^\circ$

- 4) Raadi xagasha a .

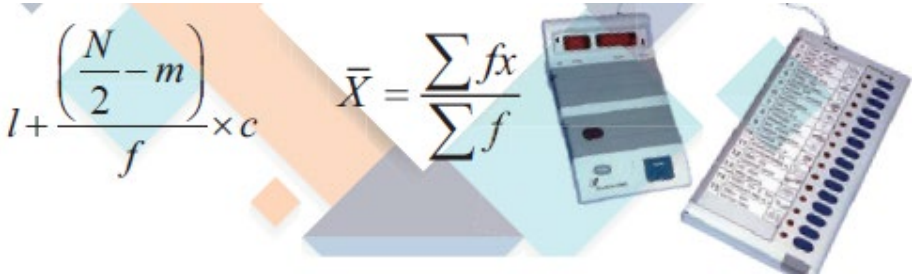
b) $\cos a = 1$

t) $\cos a = 0.707$

j) $\cos a = 0.67$

x) $\cos a = 0$

Cutubka 9aad: Istaatistikis



Horudhac

Sidii aan ku soo barannay cutubkii 7aad ee heerka koowaad ee maaddada xisaabta, cilmiga istaatistikada waa cilmi la xariira ururinta, habaynta, falanqeynta iyo tajumaadda xogta si aan ugu dhisanno go'aanno la xirfadda nolosha. Cutubkii hore waxa aan kusoo barannay hababka xogta loo uruuriyo, islamarkaana loo habeeyo iyo sida loogu soo bandhigo garaafyo. Cutubkaan waxa aan ku baran doonnaa cabbiraadda xuddunta xogta iyo kala tagsanaanta xogta.

Tusmada Cutubka

Cutubkaan waxa aan ku baran doonnaa casharrada hoose:

1. Cabbiraadda ujanjeeridda xuddunta ee xog
2. Cabiraadda kala tagsanaanta xog

Ujeeddooyinka Cutubka

Dhammaadka cutubkaan bare-ardaydu, waxa ay awood u yeelan doonaan in ay:

1. Cabbiri karaan tiro sinka, badidhacaha iyo dhexfurka ee xog kooxeysan iyo xog aan kooxeysneyn.
2. Cabbiri karaan faraqa, kala-tagsanaanta iyo leexsanaanta beegaalka ah ee xog aan kooxeysneyn.

9.1 Cabbiraadda Ujanjeeridda Xudunta

Dhammaadka casahrkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Cabbiri karaan tirosinka, dhexfurka, iyo badidhacaha xog aan kooxeysneyn.
2. Cabbiri karaan tiro-sinka, dhexfurka, iyo badidhacaha xog kooxeysan
3. Furfuri karaan mas'alooyin la xariira xogaha kooxeysan iyo kuwa aan kooxeysneyn.

Waxaan nolosha ku aragnaa in marar badan loo baahan karo in tilmaamo laga bixiyo xog la haysto. Tusaale ahaan, qof cilmi baare ah ayaa dhihi kara celceliska saacadaha ay dadku daawadaan telefshinku waa 3 saac maalintii, taasina micnaheedu maaha in ay maalinkasta sidaa ay dhacayso, dadka qaar ayaa daawan kara in kadab ama ka yar saacadahaas. Celcelisku waa muujiye inoo tilmaamaya xogta waxa uuna xog badan kusoo ururiyaa hal tiro ayadoo la ogsoonyahay in ay jiri doonaan kala duwanaansho celceliska iyo xogta dhabta ah u dhaxeeya.

Keliya ma ahan celcelisku cabbiraadda keliya ee la haysto. Istaatistikisyahannadu waxa ay adeegsadaan cabbirro kale sida dhexfurka iyo badidhacaha. Xogta ladoonayo in la cabbiro xuddenteeda ayaa waxa ay noqon kartaa mid la kooxeeyay ama mid aan la kooxeyn.

9.1 .1 Tiro-sinka Xog aan Kooxeysneyn

Waxqabadka 1aad

Waxa aan raadinaynaa celceliska xogta la'i siiyay

21, 30, 22, 16, 24, 28, 18, 17

Tusaalaha 1aad: Xogta hoose waxa ay tilmaamaysaa dhererrada 12 arday oo ka mid ah ardayda dugsiga ee doonaya in ay ka qeybqaataan ciyaaraha kubbadda kolayga ee dugsiga.

148, 142, 150, 150, 148, 140, 140, 147, 148, 148, 145, 150.

Haddaba, waxa aan helaynaa tirosinka xogtan aan kooxeysneyn.

Furfuris

Haddaba, marka aynu helaynaa tirosinka xogta aan kooxeysneyn waxaa aan u mari karnaa jidadkaan mid ka mid ah:

1. In aan isu wada gayno kadibna aan u qeybinno tirada tibxaha.

$$\frac{148 + 142 + 150 + 150 + 148 + 140 + 140 + 147 + 148 + 148 + 145 + 150}{12}$$

$$= \frac{1756}{12} = 146.33$$

2. In aan adeegsanno baahsanaanta rakaadka ee xogta aan kooxeysneyn.

Dhererka	Tirada ardada (rakaadka)
140	2
142	1
150	3
148	4
145	1
147	1

Kadibna waxa aan isku dhufaneynaa dhererka iyo rakaadkiisa

Dhererka (x)	Rakaadka (f)	fx
140	2	280
142	1	142
150	3	450
148	4	592
145	1	145
147	1	147
	$\Sigma f = 12$	$\Sigma fx = 1756$

Kadibna waxa aan adeegsanaynaa xeerka hoose:

$$\bar{x} = \frac{\Sigma fx}{\Sigma f}$$

$\bar{x}$ waa summad inoo matalaysa celcelisk, Σ waa summad u taagan wadarta, f waa rakaadka, x waxa ay inoo matalaysaa dhererka.

Haddaba,

$$\bar{x} = \frac{\Sigma fx}{\Sigma f} = \frac{1756}{12} = 146.33sm$$

Tusaalaha 2aad: Haddii celceliska 6 tibix ee xog uu yahay 45 haddaba, raadi celceliska cusub haddii tibix kasta lagu kordhiyo 4.

Furfuris

U qaado lixda tibxood in ay kala yihiin sidatan,

$$x_1, x_2, x_3, x_4, x_5, x_6$$

Haddii tibixdii lagu kordhiyo 4,

$$x_1 + 4, x_2 + 4, x_3 + 4, x_4 + 4, x_5 + 4, x_6 + 4$$

Haddaba, celceliska cusub waa:

$$\bar{x} = \frac{(x_1 + 4) + (x_2 + 4) + (x_3 + 4) + (x_4 + 4) + (x_5 + 4) + (x_6 + 4)}{6}$$

$$\bar{x} = \frac{x_1 + x_2 + x_3 + x_4 + x_5 + x_6 + 24}{6}$$

$$\bar{x} = \frac{x_1 + x_2 + x_3 + x_4 + x_5 + x_6}{6} + \frac{24}{6}$$

$$\bar{x} = 45 + 4 = 49$$

Waxqabadka 2aad

Haddii tirosinka 7 tibxood ee xog uu yahay 30 haddaba, waxa an raadinaya tirosinka cusub haddii tibix kasta loo qeybiyo 3.

9.1 .2 Tirosinka Xog Kooxeysan

Waxqabadka 3aad

Waxa aan kooxaynaynaa xogta hoose anniga oo isugu xiraynaa shan shan islamarkaana adeegsanaynaa tusaha rakaadka.

85 88 104 76 77 79 83 84 71 75 82 96 83 75 76 82 103 85 79 77 83 86 88
102 95 96 99 102 75 72.

Xogta marka loo kooxeeyo kooxo yaryar oo isla'eg badanaa waxaa lagu muujiyaa tusaha rakaadka. Tusaale ahaan xogta hoose waxa ay tilmaamaysaa da'da macmiilka ceelka biyaha.

Da'da (sanad)	Tirada Macaamiisha
10 – 20	70
20 – 30	80
30 – 40	40
40 – 50	32
50 – 60	10

Matalan 20 – 30 waxaa ay u taagantahay macamiisha ay da'doodu u dhaxayso 20 sano ilaa 30 sano waxa ay gaarayaan 80. Sidoo kale, lama garan karo da'da qofka maadaama ay da'du kooxeysantahay. Marka waxa aan oran karnaa da'da qof gooni ah waxa ay ku dhax jirtaa 20 jir ilaa 30 jir. Tirada kala barta koox kasta waxaa lagu helaa sidatan:

$$x = \frac{\text{tirada ugu yar} + \text{tirada ugu wayn}}{2}$$

Haddaba, si aan u helno tirosinka xog kooxeysan waxa aan maraynaa tallaabooyinka hoose:

1. Raadi tirada ka barta kooxkasta x .
2. Kadibna ku dhufo rakaadka fx kadibna wadaray Σfx
3. U qeybi Σf wadaraynta Σfx ama $\left(\frac{\Sigma fx}{\Sigma f}\right)$

Da'da (sanad)	Barta bartamaha (x)	Rakaadka (f)	fx
10 – 20	15	70	1050
20 – 30	25	80	2000
30 – 40	35	40	1400
40 – 50	45	32	1440
50 – 60	55	10	550
		$\Sigma f = 232$	$\Sigma fx = 6440$

Haddaba, tiro-sinka da'da waa,

$$\bar{x} = \frac{\Sigma fx}{\Sigma f} = \frac{6440}{232} = 27.76$$

Waxqabadka 4aad

Xogta hoose waxa ay tilmaamaysaa tirada dadka deggan xaafadda Dayax iyo da'dooda. Haddaba waxa aan raadinaynaa celceliska da'da dadka deggan xaafadda annaga oo adeegsanayna xogta hoose:

Da'da (sanad)	Tirada dadka
0 – 10	3
10 – 20	7
20 – 30	8
30 – 40	6
40 – 50	4
50 – 60	2

Layli

Culeyska (kg)	15 – 25	25 – 35	35 – 45	45 – 55	55 – 65	65 – 75
Tirada ardayda	4	11	19	14	0	2

1. Haddii toddobaadkan heerkulkii la diiwaangeliyay uu yahay sida hoose, raadi tiro-sinka heerkulka usbuuca.

$26^{\circ}C, 24^{\circ}C, 28^{\circ}C, 31^{\circ}C, 30^{\circ}C, 26^{\circ}C, 24^{\circ}C$

2. Haddii tiro-sinka culayska 4 xubnood oo qoyska ka mid ah uu yahay 60kg, saddex kamid ahna uu culeyskoodu yahay 56kg, 68kg iyo 72kg, haddaba raadi culeyska ruuxa afaraad.
3. Imtixaanka maaddada xisaabta ayaa 10 arday waxa ay heleen 75 dhibcood, 12 arday waxa ay heleen 60 dhibcood, 8 arday waxa ay heleen 40 dhibcood, 3 ardayna waxa ay heleen 30 dhibcood. Haddaba, raadi celceliska dhibcahooda.
4. Haddii tiro-sinka xogta hoose uu yahay 20.2, raadi qiimaha x .

Dhibcaha	10	15	20	25	30
Tirada ardayda	6	8	x	10	6

5. Ardayda fasalka ayaa la cabbiray culeyskooda waxa ay xogtaas ka muuqataa tusaha hoose. Haddaba raadi tiro-sinka culeysyadooda:

Culeyska (kg)	15-25	25-35	35-45	45-55	55-65	65-75
Tirada ardayda	4	11	19	14	0	2

9.1.3 Dhexfurka Xog aan kooxeysneyn

Dhexfurku waa qiimaha dhaca bartanka xogta markii xogta loo tibaaxo horsanaanta degata ama fanata.

Waxqabadka 5aad

Haddii dhererrada 9 arday ay kala yihiin sidatan 124sm, 140sm, 141sm, 147sm, 161sm, 125sm, 135sm, 122sm, 138sm haddaba waxa aan raadinaynaa dhexfurka.

Tusaalaha 1aad: Xogta hoose waxa ay ina tusaysaa dhibcaha ay keeneen 11 arday:

7, 21, 45, 15, 55, 32, 20, 0, 59, 62, 25. Haddaba raadi dhexfurka.

Furfuris

Marka hore xogta ayaan u tibaaxaynaa horsanaanta degata

0, 7, 15, 20, 21, 25, 32, 45, 55, 59, 62

Maadaama tirada xogta ay tahay kisi, dhexfurku waxa uu dhici doonaa booska 6aad waxaana ku began tirada 32.

Sidaas darted dhexfurka xogtu waa 32.

Tusaalaha 2aad: Xogta hoose waa xog aan kooxeysnenyn. Waxa aan raadinaynaa dhexfurka xogta.

10, 17, 16, 21, 13, 18, 12, 10, 19, 22.

Furfuris

Marka hore xogta waxa aynu u tibaaxaynaa horsanaanta degata,

10, 10, 12, 13, 16, 17, 18, 19, 21, 22

Maadaama tirada xogta ay tahay dhaban, dhexfurku waxa uu dhici doonaa celceliska tirooyinka ku beegen boosaska 5aad iyo 6aad, waxaana ku beegan tirooyinka 16 iyo 17.

Celceliska labada tiro waa $= \frac{16+17}{2} = \frac{33}{2} = 16.5$

Tusaalaha 3aad: Xogta hoose waxa ay ku saabsantahay dhibcaha ay ka heleen 12 arday ee dhigta fasalka maaddooyinka xisaabta iyo sayniska.

Xisaab	68	55	20	30	65	40	58	25	50	75	33	36
Saynis	54	42	48	49	27	25	24	19	28	58	45	69

Haddaba raadi maadada ay ku fiicanyihiin ardayda.

Furfuris

Marka hore waxa aan u tibiaaxaynaa horsanaanta degata dhibcaha labada maaddo.

Xisaab	20	25	30	33	36	40	50	55	58	65	68	75
Saynis	19	24	25	27	28	42	45	48	49	54	58	69

Maadaama tirada aydaydu ay tahay 12, waxa aan helaynaa dhexfurka labada maaddo.

Maadaama tirada ay tahay dhaban labada tiro ee dhexe ayaan helaynaa celceliskooda:

$$\text{Xisaabta: } \frac{40+50}{2} = 45$$

$$\text{Saynis: } \frac{42+45}{2} = 43.5$$

Haddaba, dhexfurka maaddada xisaabta ayaa ka wayn dhexfurka maaddada sayniska. Markaa waxa aan oran karnaa maaddada xisaabta ayay ardayu ku fiicanyihiin.

Adeegsiga Baahsanaanta Rakaadka xog aan Kooxeysneyn

Marka aynu dooneyno in aynu adeegsanno baahsanaanta rakaadka aan kooxeysneyn si aan u helno waxa aynu u maraynaa jidka hoose:

1. Marka hore xogta u qor horsanaanta degata ama fanata.
2. Waxa aan dhisaynaa tusaha baahsanaanta aruurka rakaadka. N u qaado wadarta aruurka rakaadka.
3. Haddii N ay tahay kisi dhexfurku waa tirada taalla booska $= \left(\frac{N+1}{2}\right)$
4. Haddii N ay tahay kisi dhexfurku waa tirada taalla booska $= \left(\frac{\left(\frac{N}{2}\right) + \left(\frac{N}{2} + 1\right)}{2}\right)$.

Tusaalaha 4aad: Waxa aan raadinaynaa dhexfurka xogta hoose.

Dhererka (sm)	160	150	152	161	156	154	155
Tirada ardayda (rakaadka)	13	9	5	4	2	3	7

Furfuris

Dhererka	$f(\text{rakaadka})$	Aruurka rakaadka (cf)
150	9	9
152	5	14
154	3	17
155	7	24
156	2	26
160	13	39
161	4	43

Haddaba, qiimaha N waa 43 oo ah wadarta rakaadyada.

Maadaama N ay tahay kisi dhexfurku waa tirada ku jirta booska $\left(\frac{N+1}{2}\right)$

Dhexfurku waa $= \left(\frac{N+1}{2}\right) = \frac{43}{2} = 22aad$

Haddii 43 da arday dhererkooda lawada taxo, ardayga 22aad ayaa noqonaya dhexfurka.

Haddaba waxa aan u baahannahay in aan helno dhererka ku beegan ardayga 22aad.

Haddii aan eegno aruurka tusaha kore, 15 arday ayaa dhererkoodu le'egyahay ama ka yaryahay 154 sm. Halka 22 ardayna uu dhererkoodu le'egyahay ama ka yaryahay 155sm. Taasi micnaheedu waa in ardayga 22aad uu dhererkiisu yahay 155sm. Haddaba dhexfurku waa 155sm.

9.1 .4 Dhexfurka Xog Kooxeysan

Baahsanaanta Rakaadka Xog Kooxeysan

Marka aynu dooneyno in aynu helno dhexfurka xog kooxeysan waxa aynu adeegsanaynaa baahsanaanta rakaadka kooxeysan si aan u helno waxa aynu u maraynaa jidka hoose:

1. Waxa aan dhisaynaa tusaha baahsanaanta aruurka rakaadka. N u qaado wadarta aruurka rakaadka.
2. Hel tibixda $\left(\frac{N}{2}\right)$
3. Kooxda ay kujirto tibixda $\left(\frac{N}{2}\right)$, ayaa waxaa loo yaqaanaa kooxda dhexfurka.
4. Ku raadi dhexfurka xeerka hoose:

$$\text{Dhexfurka} = l + \frac{\left(\frac{N}{2} - m\right)}{f} \times c$$

l =waa xadka hoose ee kooxda dhexfurka ku beegmo.

f =rakaadka kooxda dhexfurka

c =ballaca kooxda dhexfurka.

N = Wadarta aruurka rakaadka (Σf).

m = Waa aruurka rakaadka ee kooxda ka horeysa kooxda dhexfurka

Tusaalaha Saad: Xogta hoose waa masruufka todobaadlaha ah ee 200 oo qoys. Haddaba, waxa aan raadinaynaa dhexfurka masruufka todobaadlaha ah.

Masruufka todobaadlaha ah (\$)	0-1000	1000-2000	2000-3000	3000-4000	4000-5000
Tirada qoysaska	28	46	54	42	30

Furfuris

Masruufka todobaadlaha ah (\$)	Rakaadka (f)	Aruurka rakaadka (cf)
0 – 1000	28	28
1000 – 2000	46	74
2000 – 3000	54	128
3000 – 4000	42	170
4000 – 5000	30	200
	$N = 200$	

Haddaba, dhexfurka kooxeedka $\frac{N}{2} = \frac{200}{2} = 100$

Tirada 100 waxa ay ku beegantahay kooxda = 2000 – 3000

$$l = 2000$$

$$m = 74$$

$$c = 1000$$

$$f = 54$$

$$\text{Dhexfurka} = l + \frac{\left(\frac{N}{2} - m\right)}{f} \times c$$

$$\begin{aligned}\text{Dhexfurka} &= 2000 + \frac{\left(\frac{200}{2} - 74\right)}{54} \times 1000 \\ &= 2000 + \frac{(100 - 74)}{54} \times 1000 \\ &= 2000 + \frac{26}{54} \times 1000 \\ &= 2000 + 481.5 \\ &= 2481.5\end{aligned}$$

Waxqabadka 6aad

Waxa aan raadinaynaa qiimaha xarafka x , ee xogta hoose, haddii uu dhexfurkeedu yahay 24.

Gaalis - ineed	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
f	6	24	x	16	9

Layli

1. Raadi dhexfurka xogta lagu siiyay 47, 53, 62, 71, 83, 21, 43, 47, 41.
2. Raadi dhexfurka xogta lagu siiyay:
36, 44, 86, 31, 37, 44, 86, 35, 60, 51
3. Dhexfurka xogtaan 11, 12, 14, 18, $x + 2$, $x + 4$, 30, 32, 35, 41
haddii loo tibaaxo horsanaanta degata waa 24. Haddaba, raadi
qiimaha x .
4. Raadi dhexfurka Xogta lagu siiyay.

Koox	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
Tirada ardayda	2	7	15	10	11	5

5. Haddii tiro-sinka shan abyoone togan yahay laba laabka
dhexfurkooda, afar abyoone oo ka mid ahna ay kala yihiin 3, 4, 6, 9,
islamarkaana dhexfurkoodu yahay 6. Haddaba raadi qiimaha
tibixda shanaad.

9.1 .5 Badidhacaha Xog aan Kooxeysnayn

Badidhacaha waa tirada ugu soo noqnoqoshada badan ee xog.

Waxqabadka 7aad

Hay'ad ayaa waxa ay doonaysaa in ay kabaha ciyaaraha oo isku cabbir ah u qeybiso ardayda fasalka 8aad. Xogta hoose waxa ay tusaysaa cabbir kasta iyo tirada ardayda.

Cabbirka kabaha	5	6	7	8	9	10
Tirada ardayda	11	12	23	24	15	2

Haddaba, waxa aan is waydiineynaa cabbirkee ayay dooran doontaa hay'adda si ay u qeybiso kabaha?

Waxqabadka 8aad

Haddii natiijada codeynta doorasho ay noqoto sida hoose, haddaba waxa aan raadinaynaa musharraxa ku guuleysanaya dooraashada.

Magaca musharraxa	Tirada Codadka
Jaamac	312,006
Farxiyo	887,991
Geeddi	611,973
Wadarta	1,811,967

Tusaalaha 6aad: 7 qof oo shaqaale ah ayaa waxa ay joornaati ahaan u qaataan: 700, 700, 400, 500, 500, 700, iyo 1000. Haddaba, waxa aan raadinaynaa badidhacaha xogta.

Furfuris

Maadaama tirada 700 ay soo noqnoqotay saddex jeer, haddaba badi dhacahu waa 700.

Tusaalaha 7aad: Waxa aan raadinaynaa badhidacaha xogta: 17, 18, 25, 25, 24, 24, 23, 23.

Furfuris

Tirooyinka kala ah 23, 24, 25 ayaa tiradiiba waxa ay soo noqotay laba jeer. Taas micnaheedu waa in xogtani ay leedahay saddex badidhace oo kala ah 23, 24, 25.

Adeegsiga Baahsanaanta Rakaadka aan Kooxeysneyn

Markii la adeegsanayo xog aan kooxeysneyn tibixda ugu rakaadka badan ayaa ah badidhacaha xogtaas.

Tusaalaha 8aad: Waxa aan raadinaynaa badi dhacaha Tirooyin ka kooban shan 4aad, afar 5aad, sagaal 6aad iyo lix 9aad. Annaga oo adeesanayna baahsanaanta rakaadka aan kooxeysneyn.

Furfuris

Tirada	4	5	6	9
Rakaadka	5	4	9	6

Maadaama tirada 6 ay leedahay rakaadka ugu badan , waxa aan leenahay badidhacaha waa 6.

9.1 .6 Badidhacaha Baahsanaanta Rakaadka Kooxeysan

Badi dhacaha xogta kooxeysan waxaa lagu helaa xeerka hoose:

$$\text{Badidhace} = l + \left(\frac{f - f_1}{2f - f_1 - f_2} \right) \times c$$

l =waa xadka hoose ee kooxda badidhacaha ka horreysa.

f =rakaadka kooxda badidhacaha

f_1 = waa rakaadka kooxda ka horeysa kooxda badidhacaha

f_2 = waa rakaadka kooxda ka ku xigta kooxda badidhacaha

c =ballaca kooxda badidhacaha.

Tusaalaha 9aad: Waxa aan raadinaynaa badidhacaha xogta hoose:

Dhibcaha	1 – 5	6 – 10	11 – 15	16 – 20	21 – 25
Ardada	8	11	17	33	25

Furfuris

Waxa an xadka hoose ee kooxkasta ka goyneynaa 0.5, halka xadka sarena aan ku darayno 0.5, tani waxa ay xogta ka dhigaysaa mid joogto ah.

Dhibcaha	Ardada
0.5 – 5.5	8
5.5 – 10.5	11
10.5 – 15.5	17
15.5 – 20.5	33
20.5 – 25.5	25

Kooxda badidhacahu waa $16 - 20$, maadaama ay wadato rakaadka ugu badan.

$$l = 15.5, f = 33, f_1 = 17, f_2 = 25, c = 5$$

$$\text{Badidhace} = l + \left(\frac{f - f_1}{2f - f_1 - f_2} \right) \times c$$

$$\text{Badidhace} = 15.5 + \left(\frac{33 - 17}{2 \times 33 - 17 - 25} \right) \times 5$$

$$\text{Badidhace} = 15.5 + \left(\frac{16}{24} \right) \times 5$$

$$\text{Badidhacaha} = 15.5 + 3.33 = 18.83$$

Layli

1. Mushaarka 10 shaqaale oo warshad ka shaqeeya ayaa ah sida soo socoto: \$5000, \$7000, \$5000, \$7000, \$8000, \$7000, \$7000, \$8000, \$7000, \$5000. Haddba raadi badidhacaha mushaarka.
2. Xogta 11, 15, 17, $x + 1$, 19, $x - 2$, 3 ayaa tiro-sinkeedu yahay 14 , raadi qiimaha x . Sidoo kale raadi badidhacaha.
3. Adiga oo adeegsanaya xogta hoose raadi badidhacaha:

Tirada	38	39	40	41	42	43	44	45
Rakaadka	36	15	37	13	26	8	6	2

4. Raadi badi dhacaha xogta hoose:

Tirada	0-10	10-20	20-30	30-40	40-50
Rakaadka	22	38	46	34	20

5. Raadi badidhacaha xogta hoose:

Culeyska	25-34	35-44	45-54	55-64	65-74	75-84
Rakaadka	4	8	10	14	8	6

9.2 Cabbiraadda Baahsanaanta Xogta (Dispersion)

Dhammaadka casahrkaan bare-ardaydu waxa ay awood u yeelan doonaan in ay:

1. Cabbiraan baaxadda, kala tagsanaanta, iyo leexsanaanta beegalka ah ee xog aan kooxaysneyn.
2. Furfuraan mas'alooyinka la xariira xogaha aan kooxaysan.

Casharadii hore waxa aan soo barannay tiro-sinka, badidhacaha iyo dhexfurka xogta kuwaasoo aan usoo adeegsanay cabbiraadda ujanjeeridda xuddunta xog.

Waxaa jira cabbirro kala duwan oo loo adeegsado kala tagsnaanta xogta waxaana ugu muhiimsan kuwan:

1. Baaxaddan (range).
2. Kala tagsanaanta.
3. Leexsanaanta beegalka ah, iwm

Haddaba, casharkaan waxa aan ku baran doonnaa saddexdan cabbir keliya.

9.2 .1 Baaxadda (range)

Waxqabadka 1aad

Waxa aan raadinaynaa cabbirrada u janjeeridda xuddunta iyo cabbirada kala taksanaanta ee xogta hoose:

Saynis	29	54	54	64	74
Xisaab	43	51	54	54	73

Kadibna waxa aan baaraynaa baahida loo qabo cabbiraadda kala taksanaanta xogta.

Qeexid: Baaxadda (range) waa farqiga u dhaxeeya tirada ugu wayn iyo tirada ugu yar ee xog. Baaxadda waxa ay cabbirtaa kala kala tagsanaanta guud ee xogta.

$$\text{baaxadda (Range)} = \text{Qiimaha Ugu Wayn} - \text{Qiimaha Ugu Yar}$$

Tusaalaha 1aad: Waxa aan raadinaynaa baaxadda xogta hoose:

9.77, 11.35, 12.46, 13.80, 15.47, 17.48, 18.37, 18.47, 18.61, 20.72,
21.49, 22.47, 31.50, 38.16

Furfuris

$$\begin{aligned}\text{baaxadda} &= \text{Qiimaha Ugu Wayn} - \text{Qiimaha Ugu Yar} \\ &= 38.16 - 9.77 \\ &= 28.39\end{aligned}$$

Tusaalaha 2aad: Waxa aan raadinaynaa baaxadda (range) xogta hoose:

9.77 10.51 14.11 12.33 16.55 28.44 20.12 20.33 38.16 33.11

Furfuris

$$\begin{aligned}\text{Baaxadda} &= \text{Qiimaha Ugu Wayn} - \text{Qiimaha Ugu Yar} \\ &= 38.16 - 9.77 \\ &= 28.39\end{aligned}$$

Waxqabadka 2aad

Waxa aan ka doodeynaa baaxadda (range) labada tusaale ee kore

baaxadda (range) waxa ay yeelan kartaa faa'ido darro maadaama ay saameyn ku yeelato tirooyin aadka u weyn ama aadka u yar.

Waxqabadka 3aad

Waxa aan raadinaynaa baaxadda xogta tirada qaboojiyaasha ku jira qaar ka mid ah guryaha ku yaalla xaafad:

Qaboojiyaha	0	1	2	3	4	Wadarta
Rakaadka	26	31	17	15	6	95

9.2 .2 Kala-tagsanaanta (Variance) iyo leexsanaanta beegaalka ah ee xog aan kooxaysneyn

Kala-tagsanaanta xog waa wadarata labajibbaarka fogaanta ay tibix kasta u jirto tiro-sinka, oo loo qeybiyay $(n - 1)$. Kalatagsanaanta waxaa lagu suntaa summadda s^2 , waxaana lagu helaa xeerka hoose:

$$s^2 = \frac{1}{n - 1} \sum (x - \bar{x})^2$$

Ama

$$s^2 = \frac{1}{n - 1} \left(\sum x^2 - \frac{(\sum x)^2}{n} \right)$$

n = tirada tibxaha xogta

x = tibix kasta

$\bar{x}$ = tiro-sinka xogta

$\sum x^2$ = Wadarta dhammaan labajibbaarada tibxaha xogta

$\sum x$ = Wadarta tibxaha xogta

Sidoo kale, leexsanaanta beegalka ah (Standard deviation) waa xidid labajibbaarka kala-tagsanaanta.

$$s = \sqrt{s^2}$$

Ama

$$s = \sqrt{\frac{1}{n-1} \Sigma(x - \bar{x})^2}$$

Haddaba, marka la tarjumayo kala-taksanaanta iyo leexsanaanta beegalka ah ee xogta, waxaa la yiraahdaa waxa ay cabbiraan inta ay tibxaha xogtu ka sarreeyaan ama ka hooseeyaan tirosinka xogta.

Tusaalaha 4aad: Waxa aan raadinaynaa taksanaanta iyo leexsanaanta beegalka ah ee xogta hoose:

1, 7, 2, 5

Furfuris

$$\Sigma x = 1 + 7 + 2 + 5 = 15$$

$$\Sigma x^2 = 1^2 + 7^2 + 2^2 + 5^2$$

$$\Sigma x^2 = 1 + 49 + 4 + 25 = 79$$

$$s^2 = \frac{1}{n-1} \left(\Sigma x^2 - \frac{(\Sigma x)^2}{n} \right)$$

$$s^2 = \frac{1}{4-1} \left(79 - \frac{(15^2)}{4} \right) = 7.583$$

$$s = \sqrt{s^2} = \sqrt{7.583} = 2.754$$

Waxqabadka 4aad

Waxa aan raadinayaa kala taksanaanta iyo leexsanaanta beegalka ah ee xogta hoose

2, 12, 7, 5, 9

Haddaba haddii qiimaha leexsanaanta beegalka ah ay wayn tahay waxa ay ina tusaysaa baahsanaan wayn in ay ka jirto xogta, halka qiimaheeda yarna ina tusayo baahsanaan yar ay u dhaxayso tibxaha xogta.

Layli

1. Adiga oo adeegsanaya xogta hoose raadi:

16, 17, 18, 21, 19, 20, 26, 22, 23, 24

- Celceliska
- Kala taksanaanta
- Leexsanaanta beegalka ah
- Baaxadda

2. Adiga oo adeegsanaya xogta hoose raadi: 18, 11, 14, 8, 11, 11, 8, 8

- tirosinka
- kala taksanaanta
- Leexsanaanta beegalka ah
- Baaxadda

3. Adiga oo adeegsanaya xogta hoose raadi:

3, 7, 2, 4, 5, 1, 1, 6, 4, 8, 10, 14

- Tirosinka
- Kala taksanaanta
- Leexsanaanta beegalka ah
- Baaxadda

4. Adiga oo adeegsanaya xogta hoose raadi:

Tirada	12	13	14	15	16	17	18	19
rakaadka	5	10	20	10	15	10	5	5

- tirosinka
- Kala taksanaanta
- Leexsanaanta beegalka ah
- Baaxadda (range)